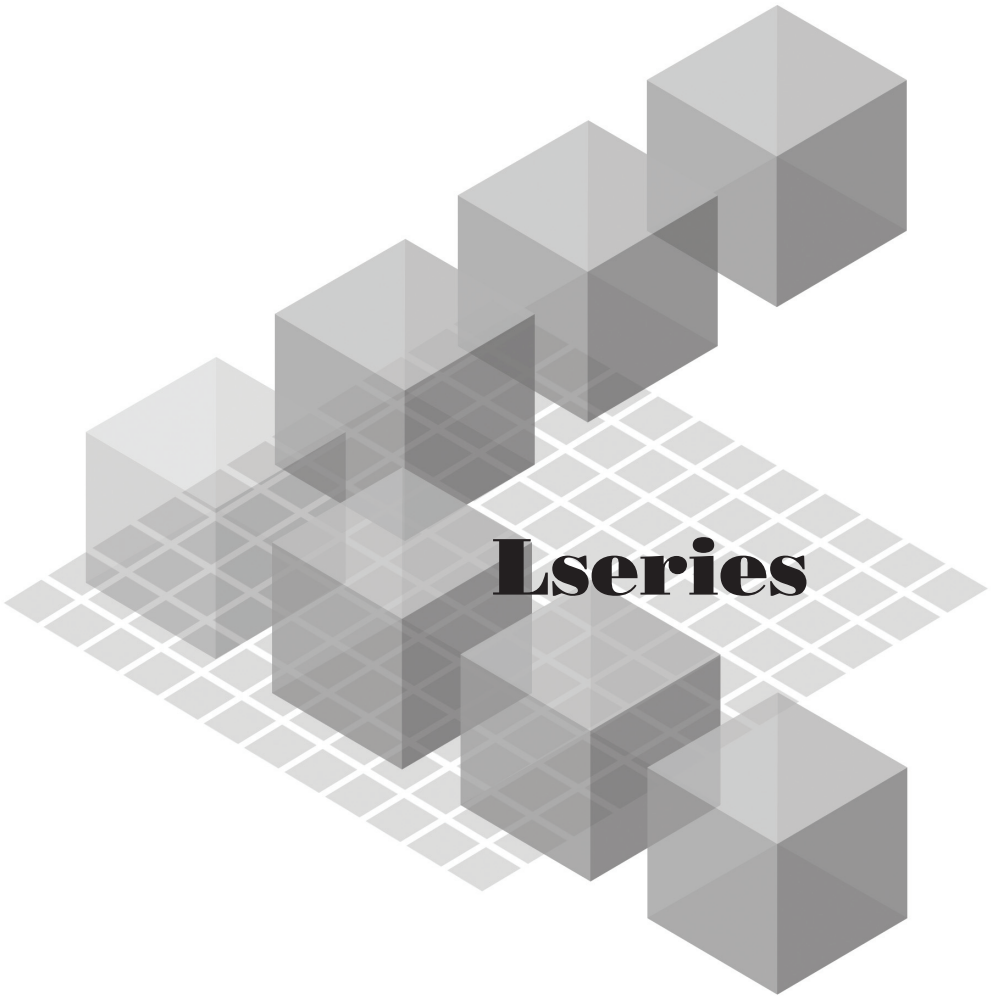
MITSUBISHI

Mitsubishi Programmable Controller

MELSEC *L series*

MELSEC-L CC-Link/LT Master Module User's Manual



MODEL

-LJ61CL12

●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- For the operating status of each station after a communication failure in the data link, refer to Page 53, Section 8.1 in this manual. Incorrect output or malfunction due to a communication failure may result in an accident.
- When connecting a peripheral with the CPU module or connecting a personal computer with an intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding.
  Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not write any data to the "system area" of the buffer memory in the intelligent function module. Also, do not use any "use prohibited" signal as an output signal from the CPU module to the intelligent function module. Doing so may cause malfunction of the programmable controller system.

[Design Precautions]

⚠ WARNING

- If a communication cable is disconnected, the network becomes unstable, causing communication failure in multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Incorrect output or malfunction due to a communication failure may result in an accident.

[Design Precautions]

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.

[Installation Precautions]

⚠ WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Installation Precautions]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines provided with the CPU module or head module. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To interconnect modules, engage the respective connectors and securely lock the module joint levers. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ WARNING

- Shut off the external power supply (all phases) used in the system before wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Wiring Precautions]

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Use cables specified by CC-Link Partner Association for a CC-Link/LT system. If not, the performance of the CC-Link/LT system is not guaranteed.
  For network wiring, follow the specifications in this manual. If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may cause the module to fail or malfunction.
- After the first use of the module, the number of connections/disconnections is limited to 50 times (in accordance with IEC 61131-2). Exceeding the limit may cause malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.

●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC-L series programmable controllers.
This manual describes the functions and programming of the LJ61CL12 CC-Link/LT master module (hereafter abbreviated as master module).

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC-L series programmable controller to handle the product correctly.
When applying the program examples introduced in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

Please make sure that the end users read this manual.

Remark

Unless otherwise specified, this manual describes the program examples in which the I/O numbers of X/Y10 to X/Y1F are assigned for a master module. I/O numbers must be assigned to apply the program examples introduced in this manual to an actual system.
For I/O number assignment, refer to the following.

MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to the manual included with the CPU module or head module.
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

To ensure that this product maintains EMC and Low Voltage Directives, please refer to the manual included with the CPU module or head module.

RELEVANT MANUALS

(1) CPU module user's manual

Manual name <manual number (model code)>	Description
MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) <SH-080890ENG, 13JZ36>	Specifications of the CPU modules, power supply modules, display unit, SD memory cards, and batteries, information on how to establish a system, maintenance and inspection, and troubleshooting
MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals) <SH-080889ENG, 13JZ35>	Functions and devices of the CPU module, and programming

(2) Head module user's manual

Manual name <manual number (model code)>	Description
MELSEC-L CC-Link IE Field Network Head Module User's Manual <SH-080919ENG, 13JZ48>	Specifications, procedures before operation, system configuration, installation, wiring, settings, and troubleshooting of the head module

(3) Operating manual

Manual name <manual number (model code>)	Description
GX Works2 Version1 Operating Manual (Common) <SH-080779ENG, 13JU63>	System configuration, parameter settings, and online operations (common to Simple project and Structured project) of GX Works2

Memo

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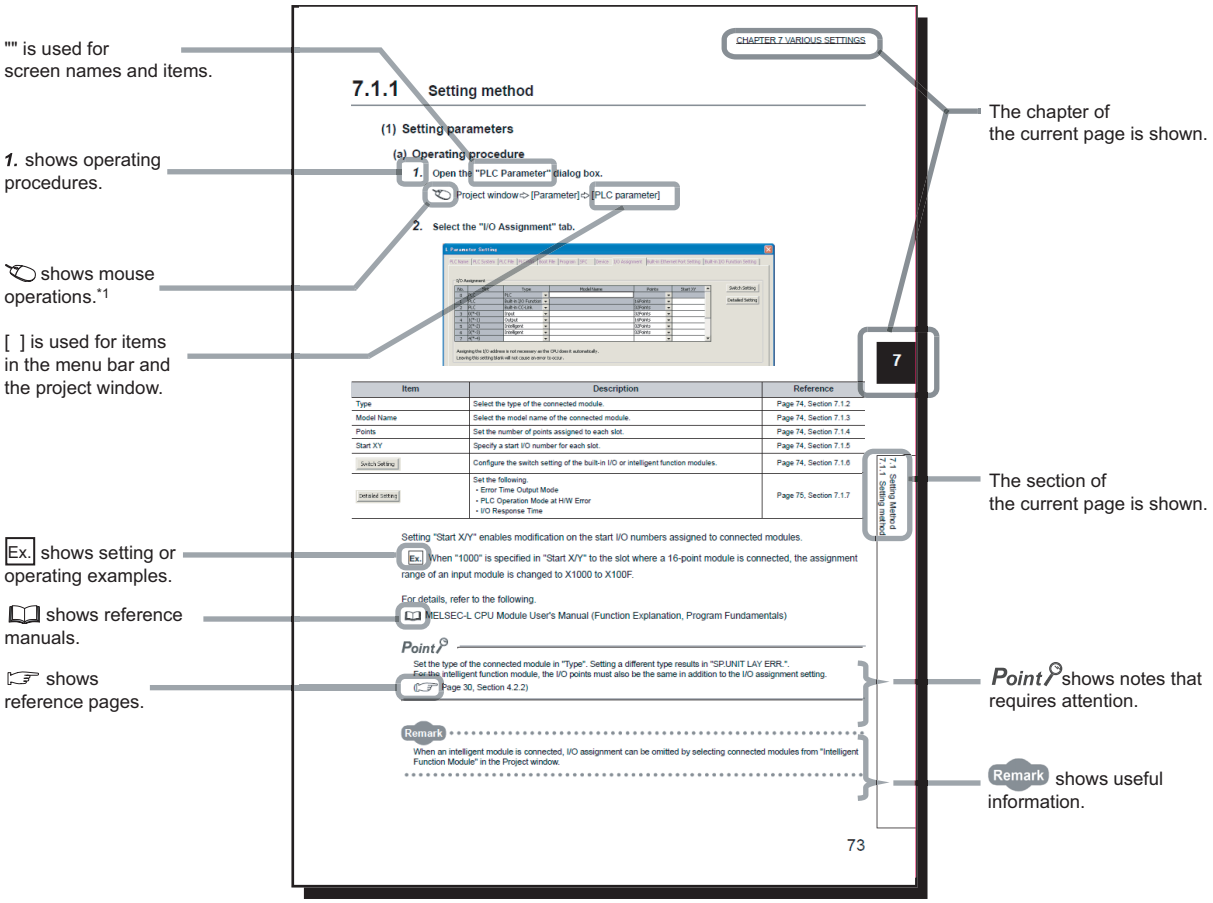
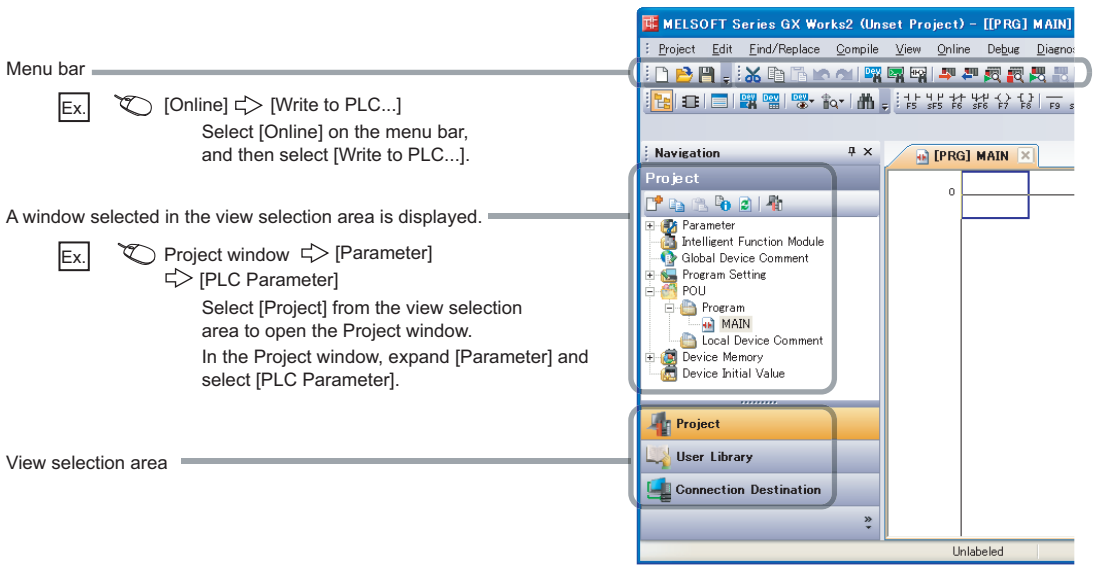
MANUAL PAGE ORGANIZATION

In this manual, pages are organized and the symbols are used as shown below.
The following illustration is for explanation purpose only, and should not be referred to as an actual documentation.



*1 The mouse operation example is provided below. (For GX Works2)



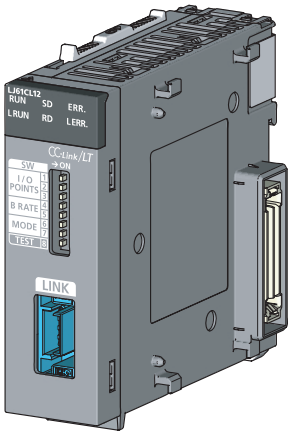
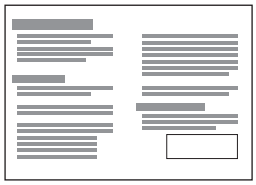
TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Master module	The abbreviation for the LJ61CL12 CC-Link/LT master module
Remote I/O module	A remote module that exchanges I/O signals (bit data) with an external device
Remote device module	A remote module that exchanges I/O signals (bit data) and I/O data (word data) with an external device, and converts analog data into digital data
Remote module	A generic term for a remote I/O module and a remote device module
CPU module	The abbreviation for the MELSEC-L series CPU module
Head module	The abbreviation for the LJ72GF15-T2 CC-Link IE Field Network head module
Master station	A station that controls a data link system. One master station is required for one system.
Remote I/O station	A remote station, such as CL2X8-D1B2 and CL2Y8-TP1B2, that exchanges I/O signals (bit data) with an external device
Remote device station	A remote station that exchanges I/O signals (bit data) and I/O data (word data) with an external device, and converts analog data into digital data
Remote station	A generic term for a remote I/O station and a remote device station. This station is controlled by the master station.
GX Works2	The product name of the software package for the MELSEC programmable controllers
Intelligent function module	A MELSEC-L series module that has functions other than input and output, such as an A/D converter module and D/A converter module
Dedicated power supply	Devices that supply power to a CC-Link/LT system. One or more devices are required for a system.
Power supply adapter	

PACKING LIST

The following items are included in the package of this product. Before use, check that all the items are included.

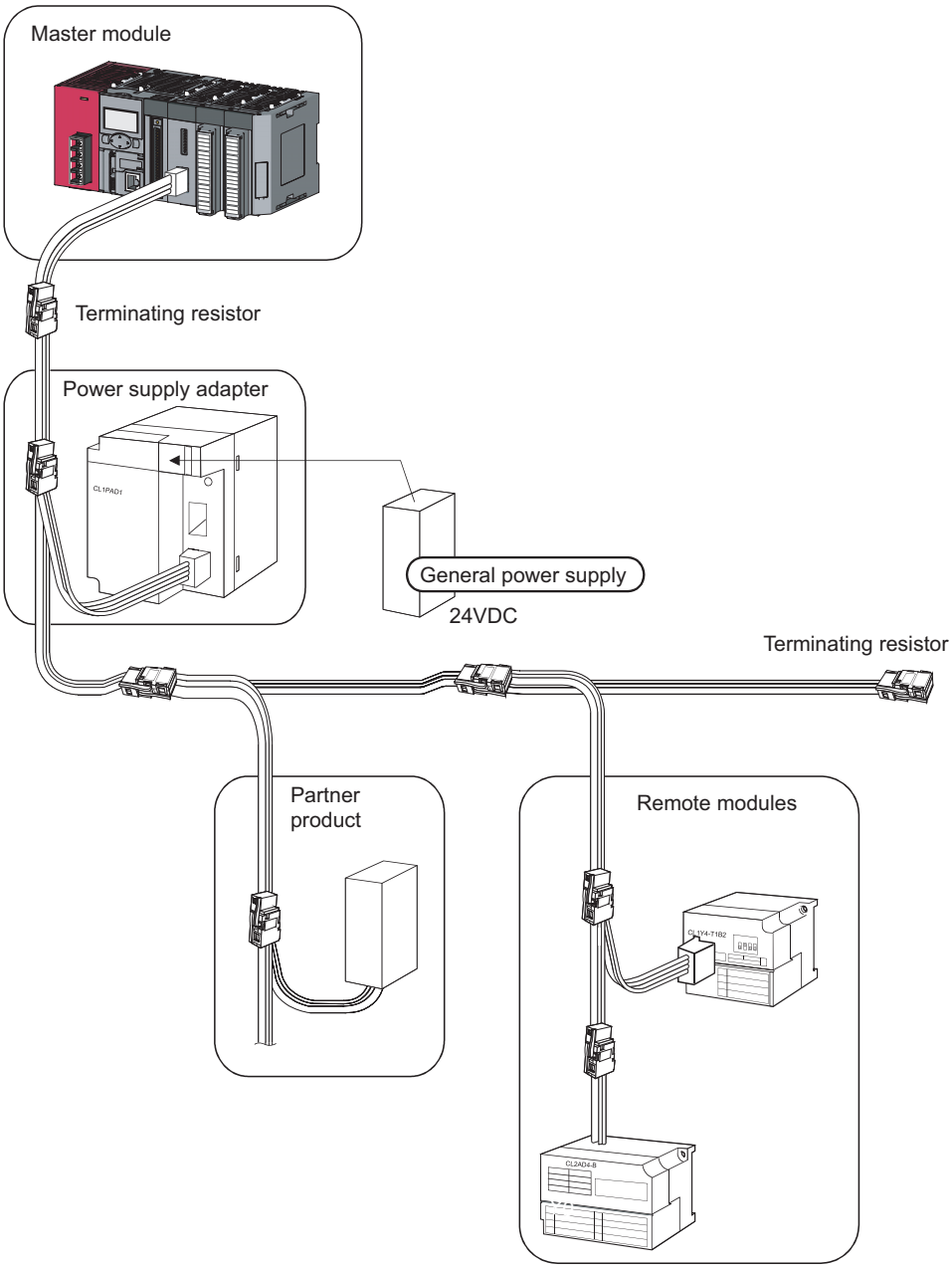
LJ61CL12	
	
LJ61CL12	Before Using the Product

CHAPTER 1 CHARACTERISTICS OF CC-Link/LT SYSTEM

This chapter describes the features and application of a CC-Link/LT system.

1.1 CC-Link/LT System

A CC-Link/LT system is a wire-saving network system used inside a control panel and equipment, making complex wiring unnecessary and preventing incorrect wiring.
This system simplifies wiring among sensor, actuator, and controller, providing advanced functionalities such as high-speed response time.



1.2 Features

This section describes features of CC-Link/LT.

(1) Easy connection/disconnection of communication cable

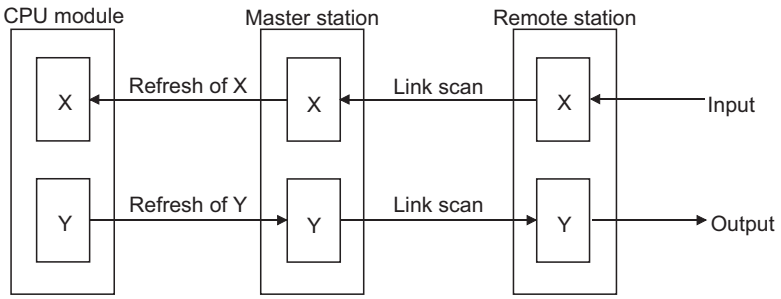
By using dedicated connectors, communication cables can be connected/disconnected with one simple motion. This allows modules to be easily extended, added, and changed.
Using dedicate flat cables, VCTF cables, and flexible cables leads to reduction in wiring work and cable cost.

(2) No parameter settings

Network parameters for operating a CC-Link/LT system need not to be set.

(3) Simplified programming

CC-Link/LT link devices are assigned for X/Y devices of the CPU module. This allows creating programs using only X/Y devices without considering the network.



(4) Transmission speed auto-tracking function

Transmission speed setting is required for the master module only and is not required for remote stations.

(5) Slave station cutoff function

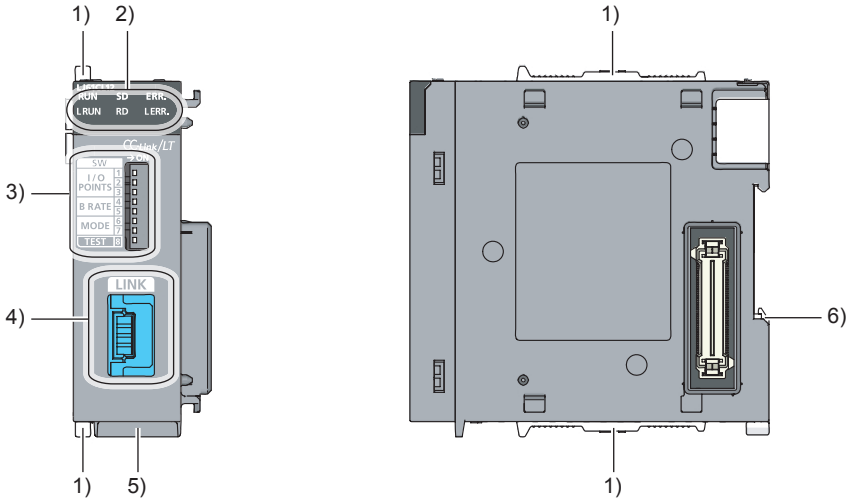
Even if a module goes down due to an error, communications among the other modules will continue.
Note if the cable on the trunk line is disconnected, data link among all stations will fail.

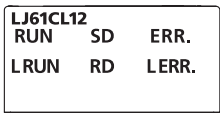
(6) Automatic return function

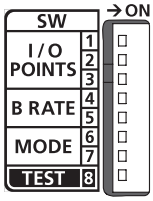
When a disconnected module recovers from an error, it automatically returns to the network and restarts data link.

CHAPTER 2 PART NAMES

This chapter describes part names of the master module.



No.	Name	Description	
1)	Module joint lever	A lever to fix module connection	
2)	LED indicator 	An indicator to check the module status	
		LED	Description
		RUN	ON: Normal module operation OFF: Hardware failure
		L RUN	<Normal operation> ON: Data link being executed OFF: Data link stopped <In test mode> ON: Normal self-loopback test OFF: Self-loopback test error
		SD	ON: Data being sent
		RD	ON: Data being received
		ERR.	ON: Incorrect switch setting Flashing: Switch setting changed during operation
		L ERR.	<Normal operation> ON: Data link faulty station or station outside control range detected Flashing: Data link error in all stations <In test mode> ON: Self-loopback test error OFF: Normal self-loopback test

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>3)</td><td>Operation setting switch
 
</td><td>A switch to configure settings including the number of occupied I/O points and the transmission speed of the master module (default: OFF)
<table>
<tr><td colspan="2">Number of occupied I/O points</td><td>16 pts.</td><td>32 pts.</td><td>48 pts.</td><td>64 pts.</td><td>128 pts.</td><td>256 pts.</td><td>512 pts.</td><td>1024 pts.</td></tr>
<tr><td>1</td><td rowspan="3">I/O POINTS</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>2</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>3</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr>
<tr><td colspan="2">Transmission speed setting</td><td colspan="2">156kbps</td><td colspan="2">625kbps</td><td colspan="2">2.5Mbps</td><td colspan="2">Setting prohibited*1</td></tr>
<tr><td>4</td><td rowspan="2">B RATE</td><td colspan="2">OFF</td><td colspan="2">ON</td><td colspan="2">OFF</td><td colspan="2">ON</td></tr>
<tr><td>5</td><td colspan="2">OFF</td><td colspan="2">OFF</td><td colspan="2">ON</td><td colspan="2">ON</td></tr>
<tr><td colspan="2">Point mode setting</td><td colspan="2">8-point mode</td><td colspan="2">4-point mode</td><td colspan="2">16-point mode</td><td colspan="2">Setting prohibited*1</td></tr>
<tr><td>6</td><td rowspan="2">MODE</td><td colspan="2">OFF</td><td colspan="2">ON</td><td colspan="2">OFF</td><td colspan="2">ON</td></tr>
<tr><td>7</td><td colspan="2">OFF</td><td colspan="2">OFF</td><td colspan="2">ON</td><td colspan="2">ON</td></tr>
<tr><td colspan="2">Test mode</td><td colspan="8"></td></tr>
<tr><td>8</td><td>TEST</td><td colspan="8">OFF: ONLINE (Normal operation)
ON : TEST mode (Self-loopback test)</td></tr>
</table>
*1 When the switch is set to "Setting prohibited", the ERR. LED turns on.</td></tr>
<tr><td>4)</td><td>CC-Link/LT interface connector</td><td>A connector to connect a communication cable in a CC-Link/LT system</td></tr>
<tr><td>5)</td><td>Serial number display</td><td>This display indicates the serial number printed on the rating plate.</td></tr>
<tr><td>6)</td><td>DIN rail hook</td><td>A hook to mount modules on a DIN rail</td></tr>
</table>

Point

The setting of the operation setting switch is enabled when the master module is powered off and on or the CPU module is reset.

If the setting is changed while power is not supplied to the module, the ERR. LED starts flashing.(Page 56, Section 8.3.3)

CHAPTER 3 SPECIFICATIONS

This chapter describes specifications of the master module.

3.1 General Specifications

For the general specifications of the master module, refer to the following.

Safety Guidelines provided with the CPU module or head module

3.2 Performance Specifications

(1) Module specifications

The following table lists the performance specifications of the master module.

Item				Specifications		
Point mode				4-point mode	8-point mode	16-point mode
Control specifications	Maximum link points (the same I/O address used)			256 points (512 points)	512 points (1024 points)	1024 points (2048 points)
	Link points per station (the same I/O address used)			4 points (8 points)	8 points (16 points)	16 points (32 points)
	Link scan time	32 stations connected	Points	128 points	256 points	512 points
			2.5Mbps	0.7ms	0.8ms	1.0ms
			625kbps	2.2ms	2.7ms	3.8ms
			156kbps	8.0ms	10.0ms	14.1ms
		64 stations connected	Points	256 points	512 points	1024 points
			2.5Mbps	1.2ms	1.5ms	2.0ms
			625kbps	4.3ms	5.4ms	7.4ms
			156kbps	15.6ms	20.0ms	27.8ms
Communication specifications	Transmission speed			2.5Mbps/625kbps/156kbps		
	Communication method			BITR method (Broadcastpolling + Interval Timed Response)		
	Network topology			T-branch type		
	Error control system			CRC		
	Number of connectable modules			64		
	Remote station number			1 to 64		
	Installation position of master station			End of a trunk line		
	RAS function			Network diagnostics, internal loopback diagnostics, slave station cutoff function, automatic return function		
	Connection cable*1			Dedicated flat cable (0.75mm^2 × 4)*5, VCTF cable*4, flexible cable*5		
Number of occupied I/O points*2				16, 32, 48, 64, 128, 256, 512, or 1024 points (I/O assignment: Intelli.)		
Internal current consumption (5VDC)				0.16A		
24VDC power supply*3		Voltage		20.4 to 28.8VDC		
		Current consumption		0.03A		
		Current on startup		0.07A		
Weight				0.12kg		

*1 When the cables other than dedicated flat cables, VCTF cables, and flexible cables are used, performance of CC-Link/LT is not guaranteed.

*2 Set the number of occupied I/O points using the operation setting switch. (☞ Page 15, CHAPTER 2).

*3 24VDC power supply is supplied through the dedicated power supply or power supply adapter.

*4 For the specifications of the VCTF cable, refer to the following.

(Extract from JIS C 3306)

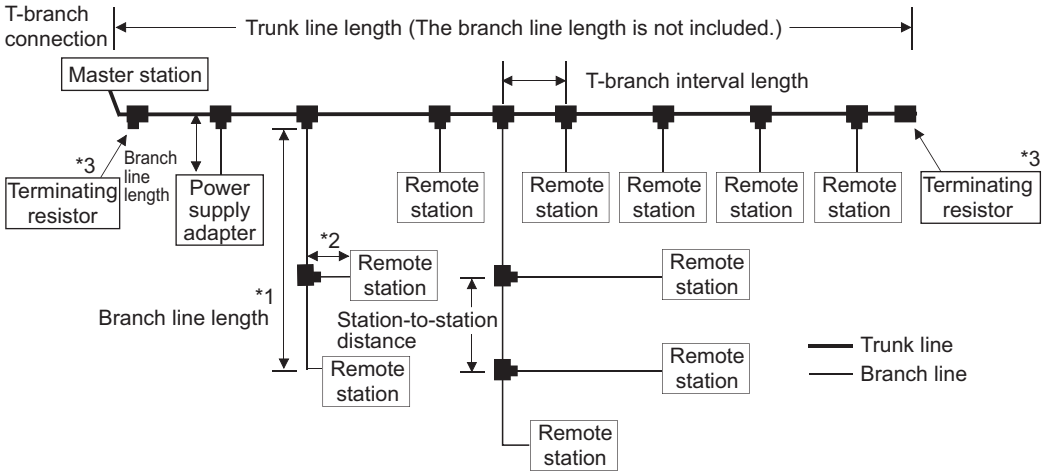
Type	No. of cores	Conductor			Insulator thickness	Sheath thickness	Conductor resistance (20°C)
		Nominal cross section	Configuration No. of wires/wire diameter	Outside diameter			
Vinyl cabtyre round code	4	0.75mm^2	30/0.18mm	1.1mm	0.6mm	1.0mm	25.1Ω/km

*5 Use the dedicated flat cables and flexible cables accredited by CC-Link Partner Association.
CC-Link Partner Association website: http://www.cc-link.org/

(2) Network wiring specifications

The following table lists the network wiring specifications of CC-Link/LT.

Item	Specifications			Remarks
Transmission speed	2.5Mbps	625kbps	156kbps	—
Station-to-station distance	No limit			—
Maximum number of modules on a branch line	8			—
Maximum length of the trunk line	35m	100m	500m	The cable length between terminating resistors at both ends (The branch line length is not included.)
T-branch interval	No limit			—
Maximum length of a branch line	4m	16m	60m	The cable length per branch line
Overall branch line length	15m	50m	200m	Total length of all branch lines

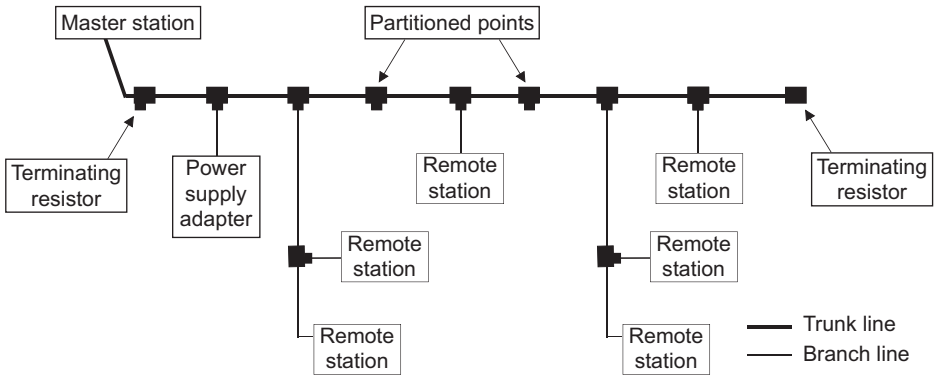


*1 The branch line length includes the length of *2. (The maximum length of the branch line and overall branch line length include the length of *2.)

*3 For the terminating resistor connection method, refer to Page 46, Section 6.3.4.

Point

A trunk line can be partitioned using up to 10 dedicated connectors.



3.3 I/O Signal List

This section describes I/O signals of the master module for the CPU module.
Input signals (X) are assigned to the remote input area, and output signals (Y) are assigned to the remote output area.
No special I/O signal is required to operate the master module.
I/O assignments vary depending on the point mode setting.
"n" in the following tables indicates the start I/O number of the master module.

Ex. When the start I/O number of the master module is "X/Y30"
Xn0 to XnF→X30 to X3F
Yn0 to YnF→Y30 to Y3F

Point

If the number of occupied I/O points is set larger than the maximum number of link points in the 4-point mode or 8-point mode, the excessive I/O points cannot be used.

Ex. When the point mode is in the 4-point mode and the number of occupied I/O points is set to 1024

According to the setting, the master module can occupy 1024 I/O points in the CPU module. However, the number of actual link points is 256 (the maximum link points when the 4-point mode is set). The rest of I/O points (768) cannot be used.

- If remote station numbers are duplicated, the duplicating stations may cause malfunction (incorrect input/output). Check that the remote station numbers are not duplicated before powering on the system.
- A remote station may occupy multiple station numbers depending on the point mode setting and the number of I/O points of the remote station.
  When using a remote station having the number of I/O points of eight or more, check that the station number of the remote station is not duplicated with that of the next station.

(1) In 4-point mode

The following tables list I/O signals in 4-point mode.

Input number	Remote input (X)															
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
XnF to Xn0	Station No.4				Station No.3				Station No.2				Station No.1			
⋮	⋮															
X(n+F)F to X(n+F)0	Station No.64				Station No.63				Station No.62				Station No.61			

Output number	Remote output (Y)															
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
YnF to Yn0	Station No.4				Station No.3				Station No.2				Station No.1			
⋮	⋮															
Y(n+F)F to Y(n+F)0	Station No.64				Station No.63				Station No.62				Station No.61			

(2) In 8-point mode

The following tables list I/O signals in 8-point mode.

Input number	Remote input (X)															
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
XnF to Xn0	Station No.2								Station No.1							
⋮	⋮								⋮							
X(n+1F)F to X(n+1F)0	Station No.64								Station No.63							

Output number	Remote output (Y)															
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
YnF to Yn0	Station No.2								Station No.1							
⋮	⋮								⋮							
Y(n+1F)F to Y(n+1F)0	Station No.64								Station No.63							

(3) In 16-point mode

The following tables list I/O signals in 16-point mode.

Input number	Remote input (X)															
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
XnF to Xn0	Station No.1															
⋮	⋮															
X(n+3F)F to X(n+3F)0	Station No.64															

Output number	Remote output (Y)															
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
YnF to Yn0	Station No.1															
⋮	⋮															
Y(n+3F)F to Y(n+3F)0	Station No.64															

3.4 Buffer Memory List

The following table lists the buffer memory areas of the master module.

For details, refer to ☞ Page 68, Appendix 1.

Address		Item	Availability
DEC	HEX		
0 to 3	0_H to 3_H	Remote station connection information	Read-only
4 to 7	4_H to 7_H	Faulty station information	Read-only
8 to 11	8_H to B_H	Remote I/O error information	Read-only
12 to 15	C_H to F_H	Use prohibited*1	—
16	10_H	Detailed error information	Readable/Writable
17	11_H	External switch information	Read-only
18	12_H	Operating status information	Read-only
19	13_H	Data link stop/restart instruction	Write-only
20	14_H	Data link last station information	Read-only
21 to 31	15_H to $1F_H$	Use prohibited*1	—
32	20_H	Detailed remote station information (Station No.1)	Read-only
to	to	to	
95	$5F_H$	Detailed remote station information (Station No.64)	
96 to	60_H to	Use prohibited*1	—

*1 Do not write data to the use prohibited area. Doing so may cause errors.

Point

The buffer memory areas can be checked using GX Works2 or a display unit.

- Using GX Works2

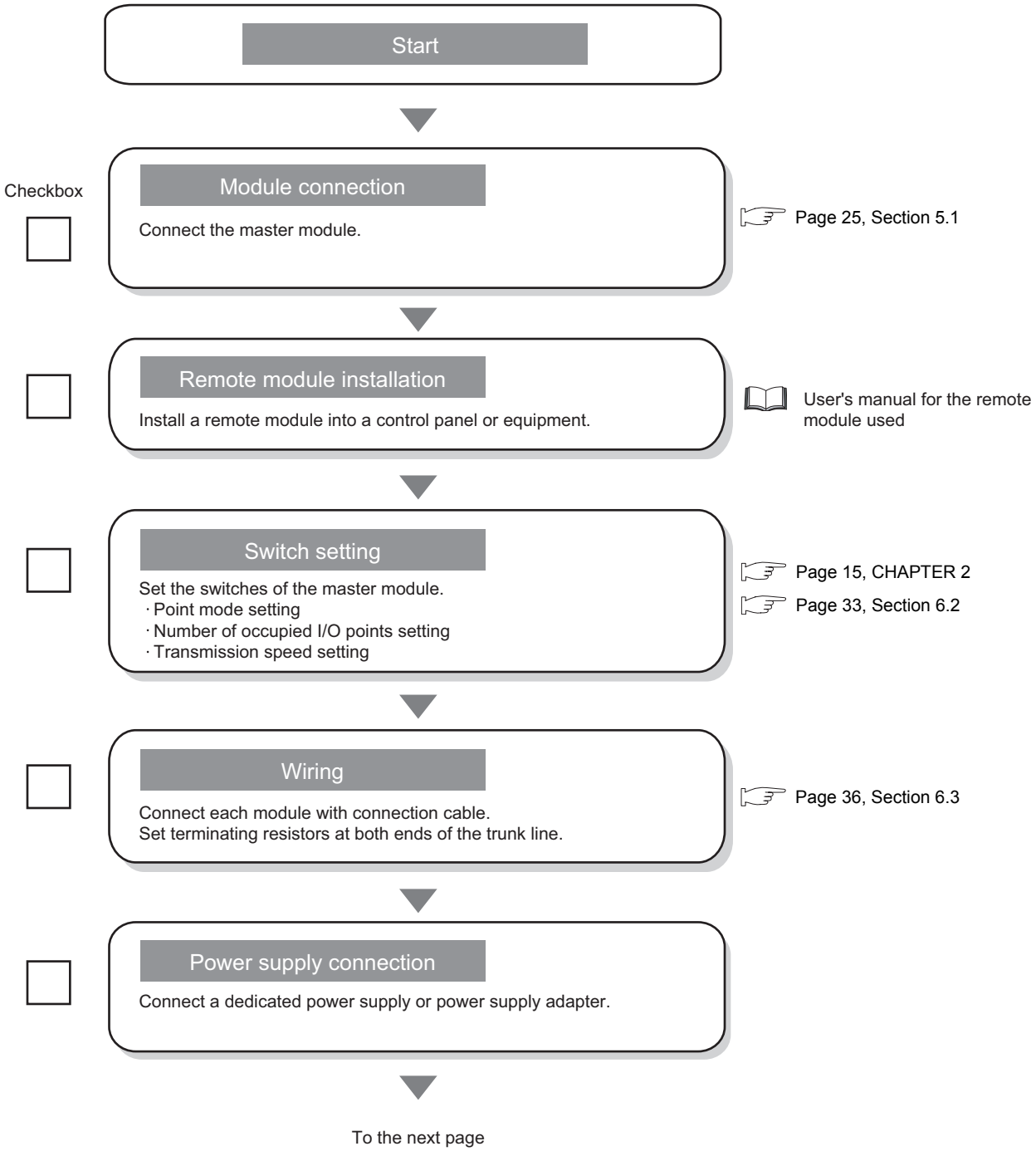
  GX Works2 Version1 Operating Manual (Common)

- Using a display unit

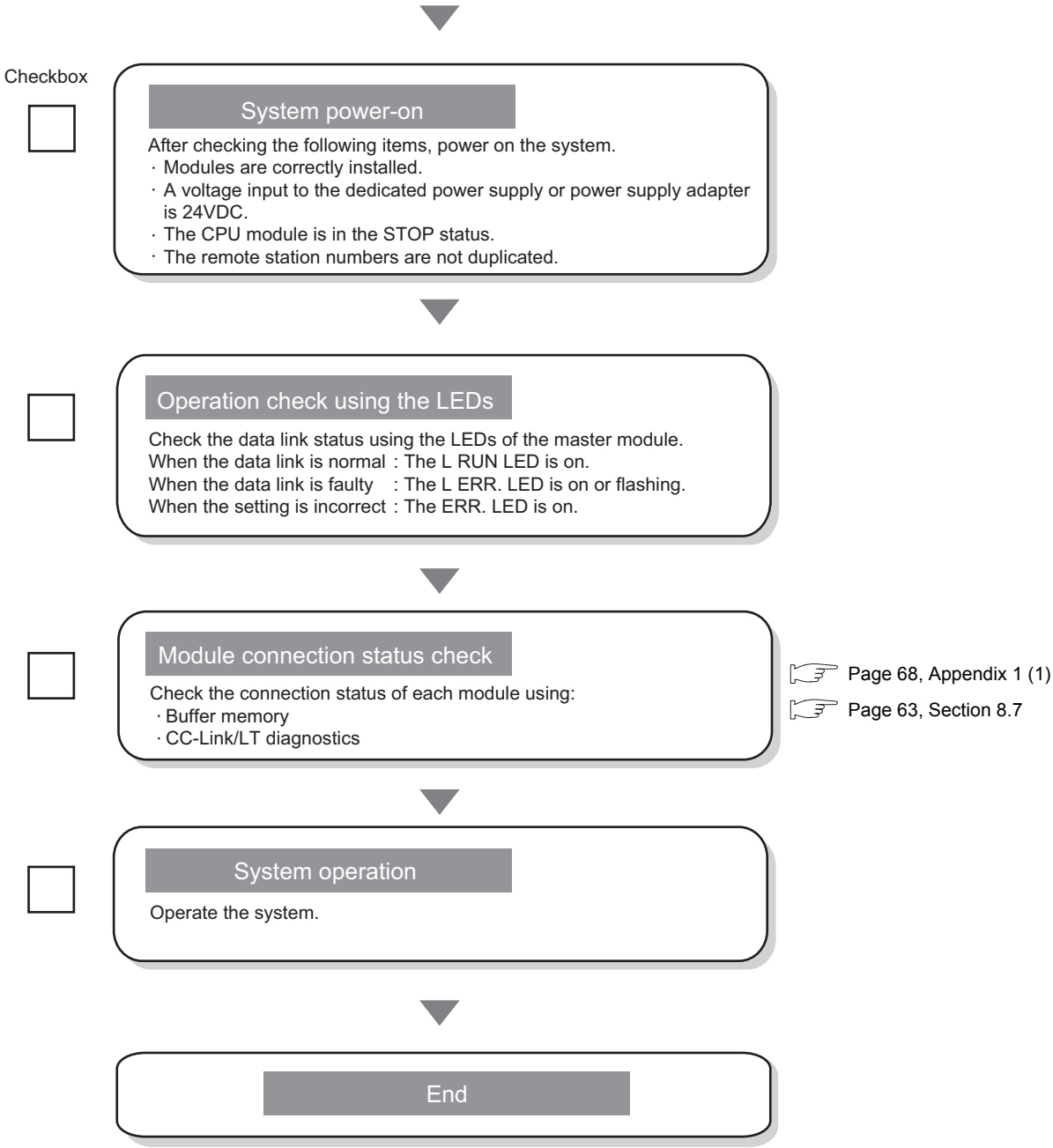
  MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

CHAPTER 4 PROCEDURE BEFORE OPERATION

This chapter describes a procedure from module installation to a data link start.



From the previous page



Point

- If remote station numbers are duplicated, the duplicating stations may cause malfunction (incorrect input/ output). Check that the remote station numbers are not duplicated before powering on the system.
- A remote station may occupy multiple station numbers depending on the point mode setting and the number of I/O points of the remote station.
  When using a remote station having the number of I/O points of eight or more, check that the station number of the remote station is not duplicated with that of the next station.
- When changing the setting of the operation setting switch of the master module or a remote station while the system is on, power off and on the system.

CHAPTER 5 SYSTEM CONFIGURATION

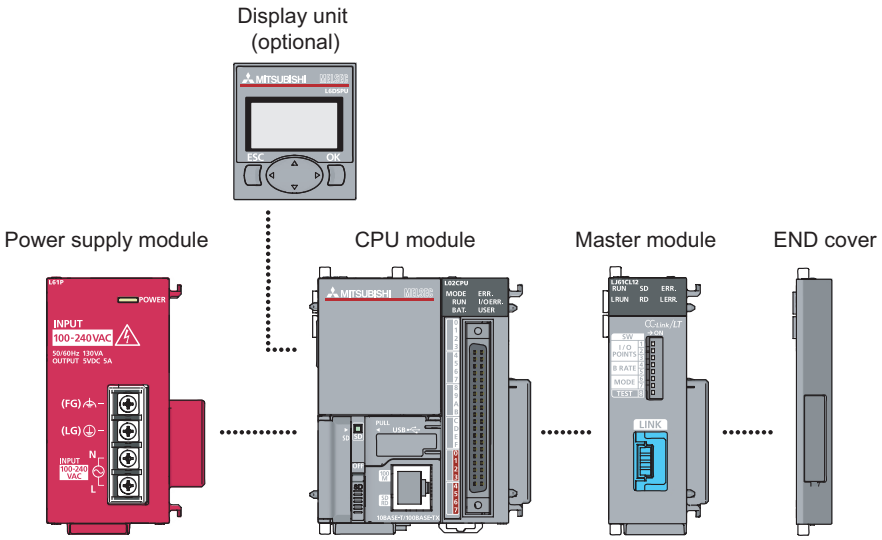
This chapter describes a CC-Link/LT system configuration.

5.1 Overall Configuration

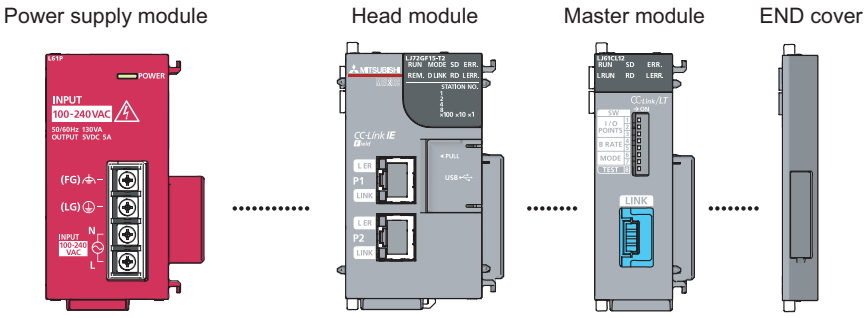
To one master station, up to 64 remote stations can be connected when the conditions on network wiring specifications are met. (Page 19, Section 3.2 (2))

(1) System configuration using the master module

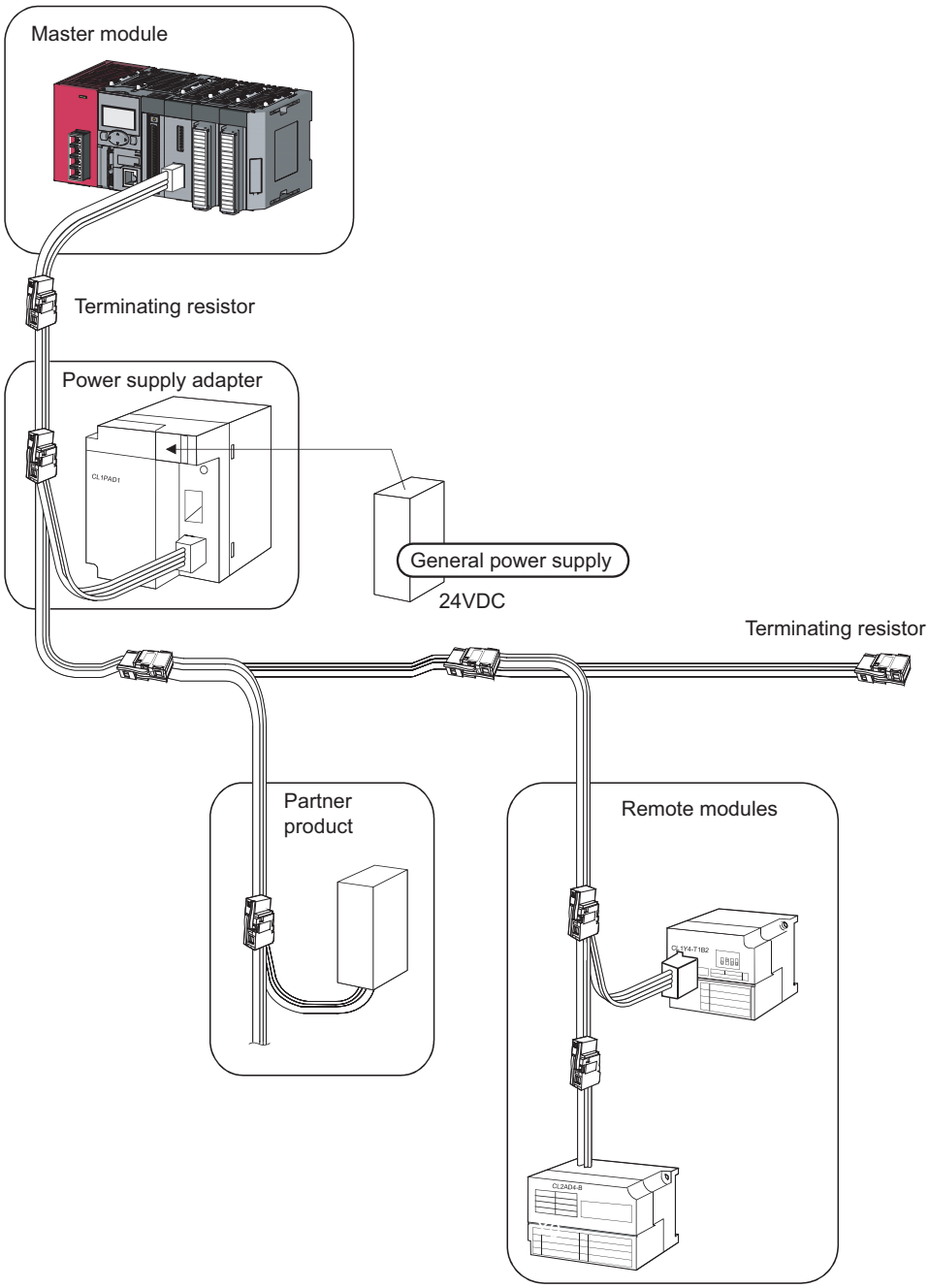
(a) When connected to a CPU module



(b) When connected to a head module



(2) CC-Link/LT system configuration



Point

- Remote stations need not to be connected in station number order.
- Remote station numbers are not necessarily consecutive. (Leaving any station number out does not cause a data link error.)

5.2 Applicable System

This section describes a MELSEC-L series system using a master module.

(1) Number of connectable modules

For the number of connectable modules, refer to the following.

MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

MELSEC-L CC-Link IE Field Network Head Module User's Manual

The number of connectable modules depends on the number of I/O points of the CPU module used and the number of occupied I/O points setting for the master module.

(2) Compatible software version

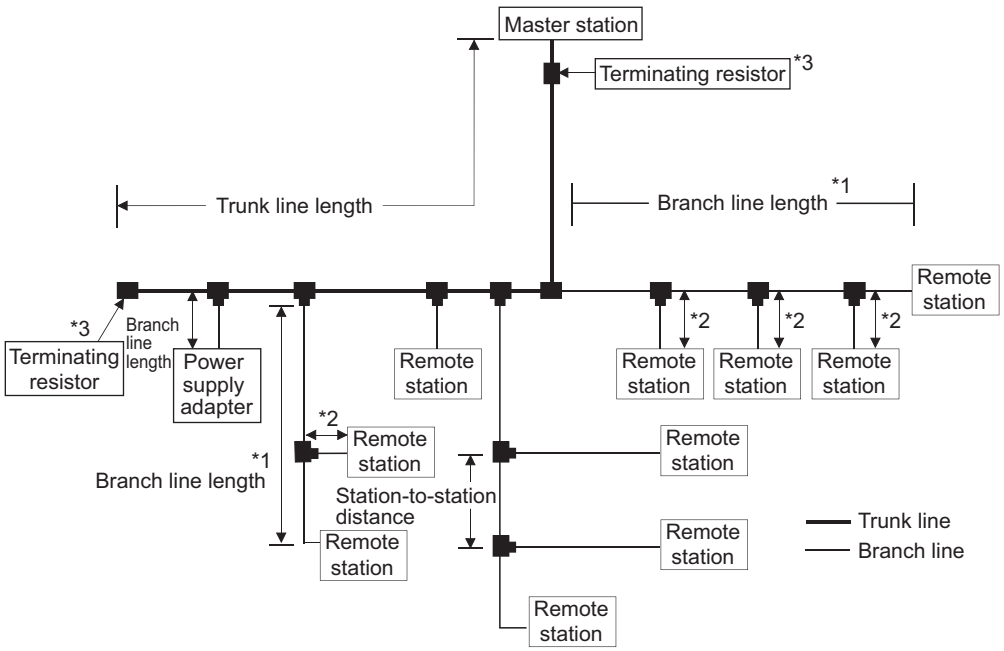
GX Works2 is required for executing CC-Link/LT diagnostics and configuring intelligent function module switches. GX Developer cannot be used.

Software	Version
GX Works2	Version 1.62Q or later

5.3 Precautions for System Configuration

(1) Master module position

Install the master module on either end of the trunk line.
Since T-branch connection is available, the master module can be apparently installed on any position on the trunk line. However, the trunk line length is defined as the length between the terminating resistors.

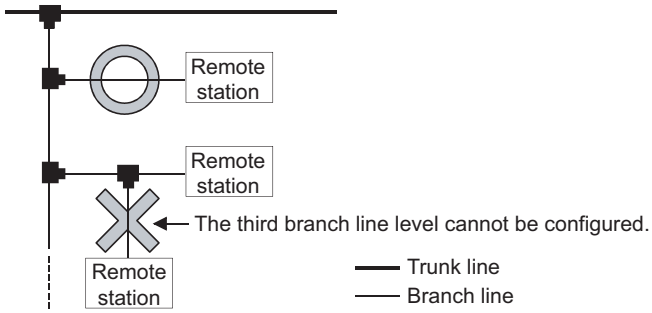


*1 The branch line length includes the length of *2. (The maximum length of the branch line and overall branch line length include the length of *2.)

*3 For the terminating resistor connection method, refer to Page 46, Section 6.3.4.

(2) Number of branch line levels

Up to two branch line levels can be configured in a CC-Link/LT system.
Three or more branch line levels cannot be configured.



(3) Installation conditions of a dedicated power supply and a power supply adapter

The installation conditions of the power supplies depend on the connected devices and wiring length.
For the conditions, refer to the user's manual for the dedicated power supply or the power supply adapter.

Point

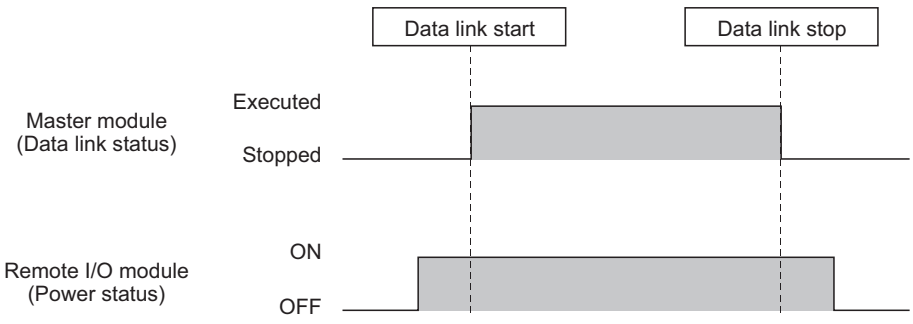
Always connect a dedicated power supply or a power supply adapter to the trunk line. (Connection to branch lines is not allowed.)

(4) Preventing incorrect input/output from remote I/O modules

To prevent incorrect input/output from remote I/O modules, design a system with considering the following:

(a) At power-on and power-off

Turn on the power of remote I/O modules (dedicated power supply or power supply adapter), then start data link.
Also, stop data link then turn off the power of remote I/O modules.



(b) At momentary power failure of remote I/O modules

If momentary power failure occurs in the power supplied to remote I/O modules (24VDC), incorrect input may occur.

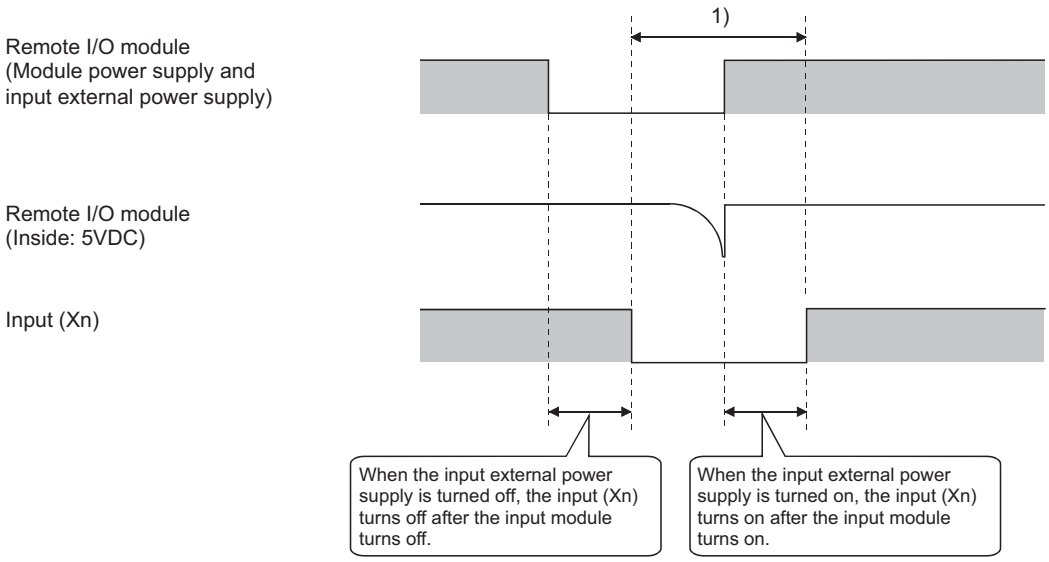
- Cause

  The hardware of the remote I/O module converts the supplied power of 24V DC into 5V DC inside the module and uses it for its own operation.

  The hardware of a remote I/O module internally converts 24VDC (module power supply) into 5VDC.

  If momentary power failure occurs in a remote I/O module, (Time until the internal power of the remote I/O module (5VDC) turns off) > (Time until the input module turns off) is met.

  Therefore, if data are refreshed within the time shown in 1) in the figure below, incorrect input may occur (This situation especially occurs when the input response time is set to high-speed response).

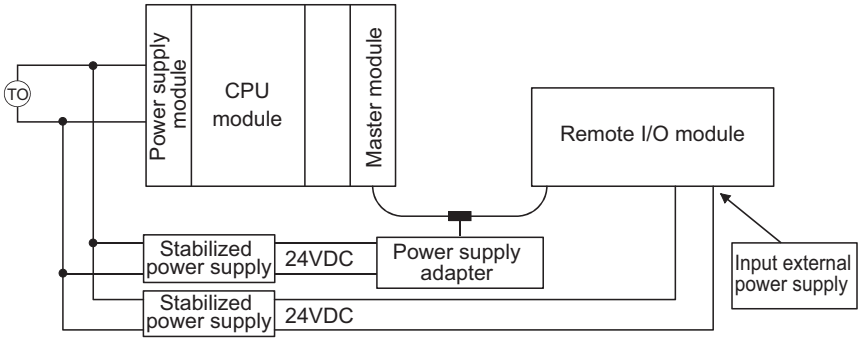


• Measures against incorrect input

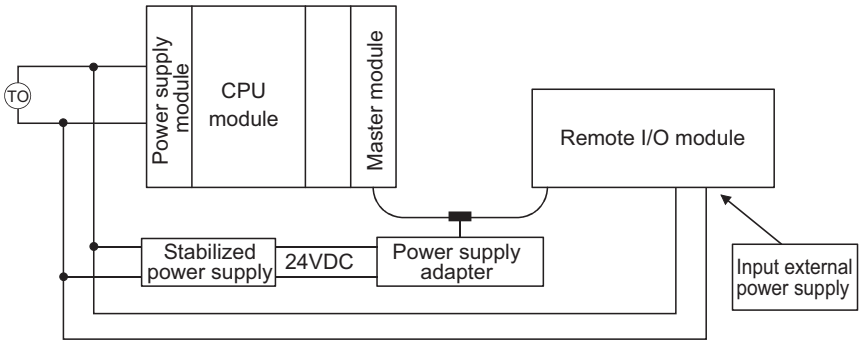
From the same power source, supply power to the power supply module, the stabilized power supply and the external supply power for input detection.

Use the same power supply for a power supply module, stabilized power supply, and input external power supply (AC input).

DC input



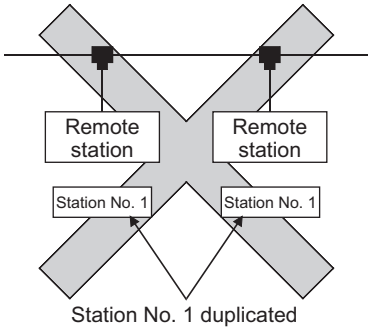
AC input



(5) Duplication of a remote station number

• If remote station numbers are duplicated, the duplicating stations may cause malfunction (incorrect input/output).

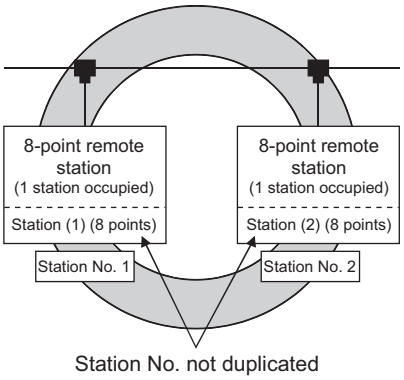
Check that the remote station numbers are not duplicated before powering on the system.



- A remote station may occupy multiple station numbers depending on the point mode setting and the number of I/O points of the remote station. When using a remote station having the number of I/O points of eight or more, check that the station number of the remote station is not duplicated with that of the next station.

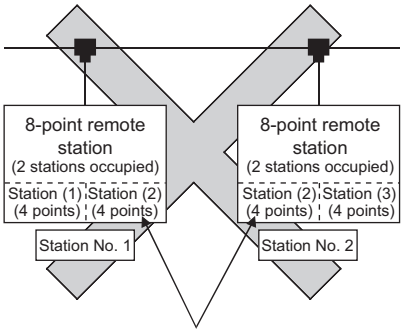
Ex. 8-point remote stations are numbered as station numbers 1 and 2

- Point mode setting: 8-point mode (8 points/station)



Station No. not duplicated

- Point mode setting: 4-point mode (4 points/station)



Station No. of station (2) duplicated

(6) Connecting a remote station for CC-Link to CC-Link/LT

A CC-Link remote station cannot be connected to the master module. Doing so may cause system malfunction.

(7) Connecting a remote station for CC-Link/LT to CC-Link

A CC-Link/LT remote station cannot be connected to the master station on CC-Link. Doing so may cause system malfunction.

CHAPTER 6 INSTALLATION AND WIRING

This chapter describes installation and wiring of the master module.

6.1 Installation Environment and Installation Position of the Module

For precautions for installation environment and installation position of the module, refer to the following.

MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

MELSEC-L CC-Link IE Field Network Head Module User's Manual

6.2 Point Mode Setting and the Number of Occupied I/O Points Setting

This section describes concepts of the point mode setting and the number of occupied I/O points setting required for system configuration.
The number of points that the master station can control per remote station occupying one station is set for the point mode setting.
Three point modes are available: 4-point mode, 8-point mode, and 16-point mode. Even if the number of occupied I/O points setting is the same, the number of controllable remote stations varies depending on the point mode setting.
Note when connecting a remote device station, use 16-point mode.

(1) Simple setting

The following table lists simple setting for the point mode and the number of occupied I/O points.
According to the number of I/O points of the remote station, set the point mode and the number of occupied I/O points with reference to the following table.

Number of I/O points of remote station	Number of occupied I/O points setting of the master module	Point mode setting of the master module
256 points or less	16 points	4-point mode
	32 points	
	48 points	
	64 points	
	128 points	
	256 points	
257 to 512 points	512 points	8-point mode
513 to 1024 points	1024 points	16-point mode

(2) Advanced setting

The following table lists the point mode and the number of occupied I/O points settings considering the number of unused points and the number of occupied stations.

- Even if the number of occupied I/O points is the same, the number of controllable remote stations varies depending on the point mode setting.
  The following table lists the number of connectable stations according to the number of occupied I/O points and point mode settings.

Number of occupied I/O points setting		16 pts.	32 pts.	48 pts.	64 pts.	128 pts.	256 pts.	512 pts.	1024 pts.
Point mode setting	4-point mode	4 stations	8 stations	12 stations	16 stations	32 stations	64 stations	64 stations	64 stations
	8-point mode	2 stations	4 stations	6 stations	8 stations	16 stations	32 stations	64 stations	64 stations
	16-point mode	1 stations	2 stations	3 stations	4 stations	8 stations	16 stations	32 stations	64 stations

Point

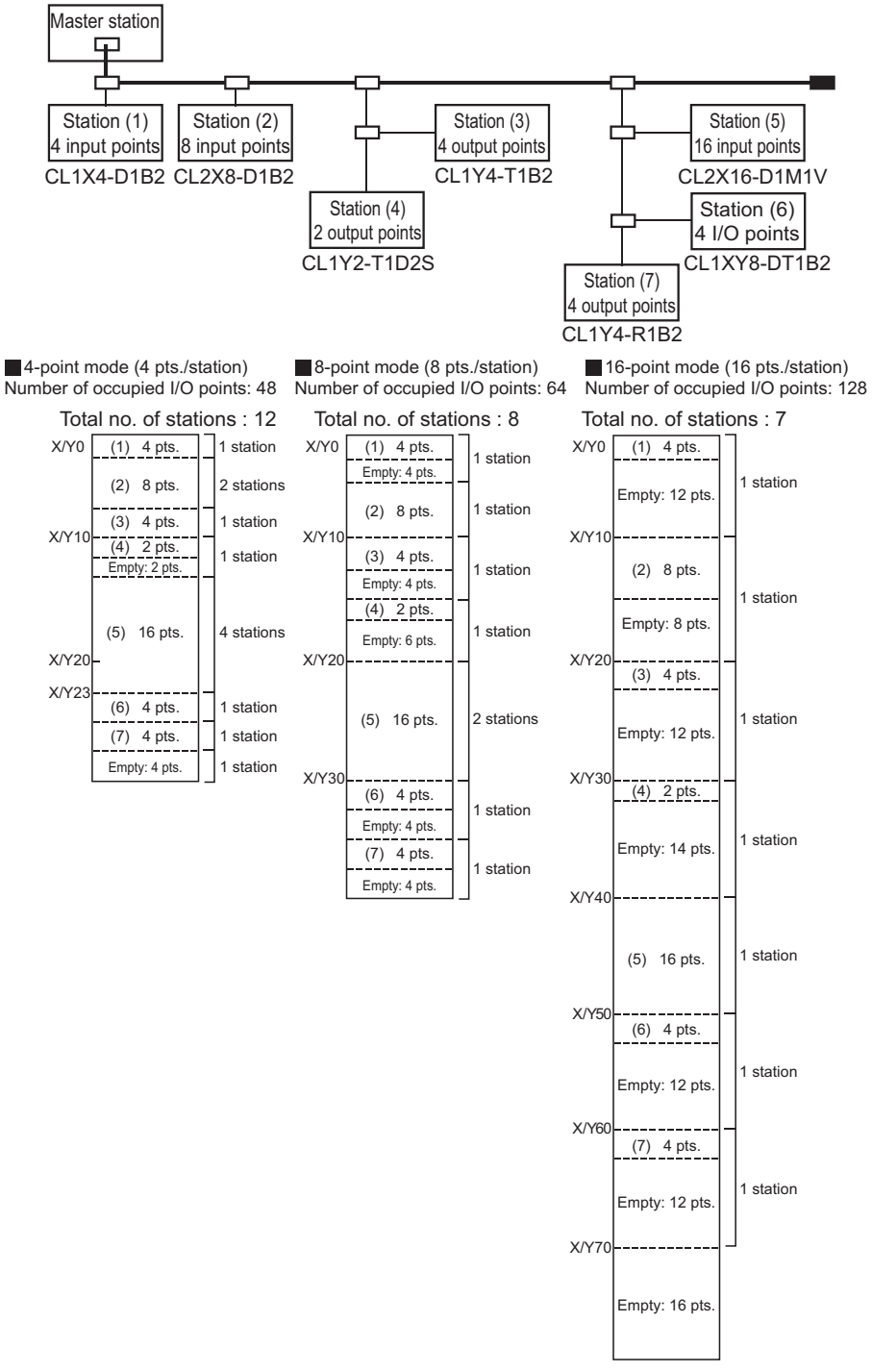
If the number of occupied I/O points is set larger than the maximum number of link points in the 4-point mode or 8-point mode, the excessive I/O points cannot be used.

Ex. When the point mode is in the 4-point mode and the number of occupied I/O points is set to 1024

According to the setting, the master module can occupy 1024 I/O points in the CPU module. However, the number of actual link points is 256 (the maximum link points when the 4-point mode is set). The rest of I/O points (768) cannot be used.

- Even if the same remote module is used, the number of occupied stations varies depending on the point mode setting.
  When 4-point mode is set for a 16-point module, for example, four stations are occupied. In the same way, two stations are occupied in 8-point mode and one station is occupied in 16-point mode.
- The optimal mode depends on the number of points of remote modules. The number of points of remote modules, which are used most in the system, should be set for the point mode. This usually minimizes the number of unused points.
  A setting example is as follows.

Ex. The system including: 2-point remote station: 1, 4-point remote station: 4, 8-point remote station: 1, 16-point remote station: 1



I/O number assignment is described using the I/O assignment table for 8-point mode in Page 75, Appendix 5. The following table lists the I/O number assignment when 8-point mode is set and 64 points is set for the number of occupied I/O points in the system shown in the example on the previous page.

Station No.	Model	Input	Output	Station No.	Model	Input	Output
1	CL1X4-D1B2	X00	Y0	5	CL2X16-D1M1V (Two stations occupied)	X20	Y0
		01	1			21	1
		02	2			22	2
		03	3			23	3
		4	4			24	4
		5	5			25	5
		6	6			26	6
		7	7			27	7
2	CL2X8-D1B2	X08	Y8	6	CL2X16-D1M1V (Two stations occupied)	X28	Y8
		09	9			29	9
		0A	A			2A	A
		0B	B			2B	B
		0C	C			2C	C
		0D	D			2D	D
		0E	E			2E	E
		0F	F			2F	F
3	CL1Y4-T1B2	X0	Y10	7	CL1XY8-DT1B2	X30	Y30
		1	11			31	31
		2	12			32	32
		3	13			33	33
		4	4			4	4
		5	5			5	5
		6	6			6	6
		7	7			7	7
4	CL1Y2-T1D2S	X8	Y18	8	CL1Y4-R1B2	X8	Y38
		9	19			9	39
		A	A			A	3A
		B	B			B	3B
		C	C			C	C
		D	D			D	D
		E	E			E	E
		F	F			F	F

6.3 Connecting Modules with Cables Connecting Modules Using Connection Cables

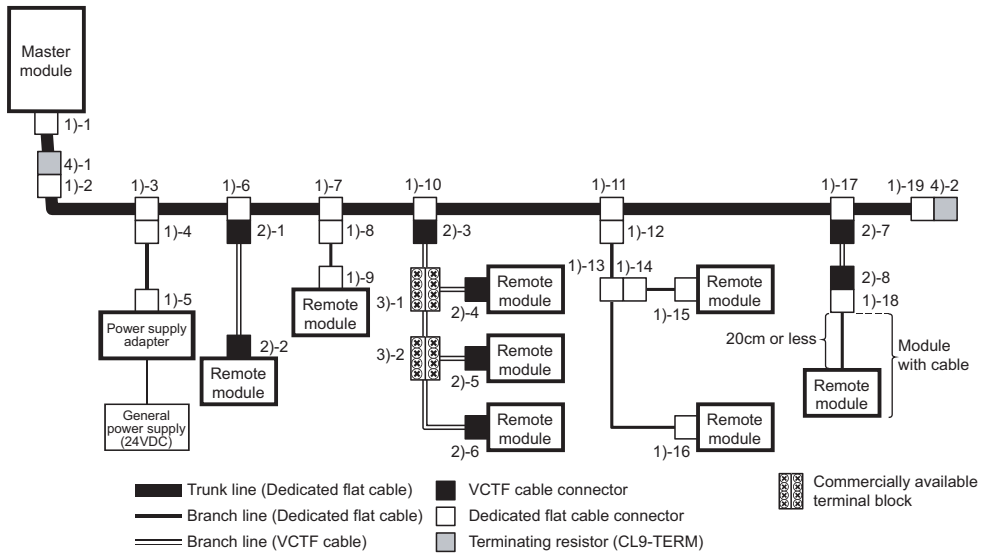
This section describes how to connect modules using connection cables in a CC-Link/LT system.

- The cables can be wired regardless of station number order.
- Install the master module on either end of the trunk line.
  Connect a terminating resistor on the master module side within 20cm from the master module.
- Connect terminating resistors to the both ends of the trunk line of CC-Link/LT without fail.
  Connect terminating resistors to the both ends of the trunk line in a CC-Link/LT system.
- For contact information on connection cables, connectors, and terminating resistors, visit:
  CC-Link Partner Association website: http://www.cc-link.org/

Point

Calculate the number of required connectors with reference to the following example.

Ex. When using a dedicated flat cable for a trunk line and VCTF cables for branch lines



The number of required connectors are as follows:

1) Dedicated flat cable connectors (number of □): 19 (1)-1 to 1)-19)

2) VCTF cable connectors (number of ■): 8 (2)-1 to 2)-8)

3) Terminal blocks (number of ⊠): 2 (3)-1 and 3)-2)

4) Terminating resistors (number of ▭): 2 (4)-1 and 4)-2)

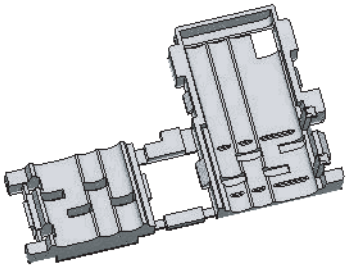
6.3.1 Connecting a dedicated flat cable connector

This section describes how to connect a dedicated flat cable connector.

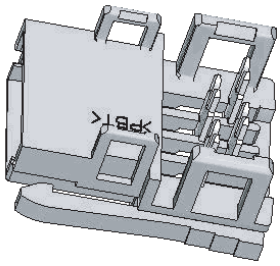
(1) Components

The components are shown below.

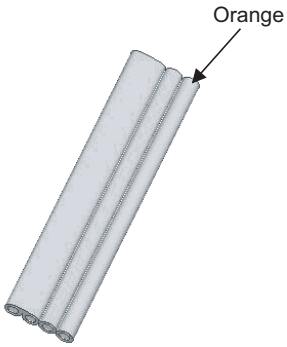
Component 1: Cover



Component 2: Body



Component 3: Dedicated flat cable

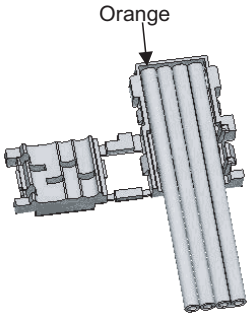


(2) Procedures

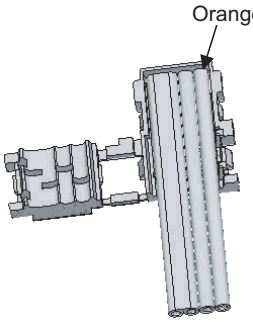
The procedures are as illustrated below.

(a) Processing cable end

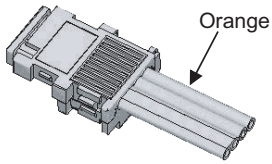
1) Correctly place the end of the dedicated flat cable in the cover. (Check that the position of the orange part is correct.)



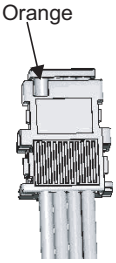
Note 1) This orientation is incorrect.



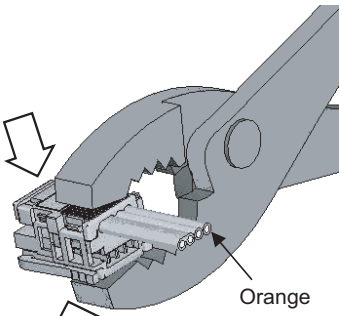
2) Close the cover so that the flat cable may be held between both sides of the cover.



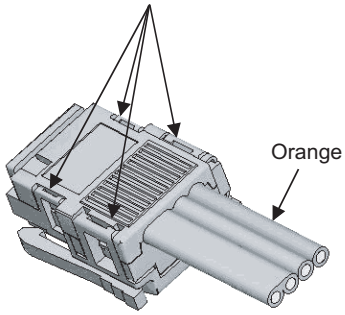
Note 2) If the orange part is visible through the notch window on the front cover, open the cover and correct the wiring.



3) Assemble the cover with the body and press them using pliers.

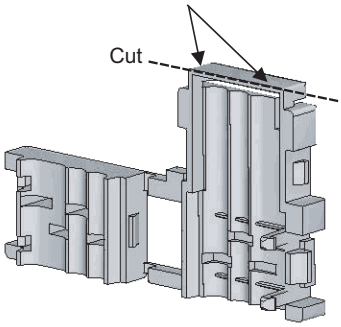


4) Check that all of four latches are engaged. Press-fitting is completed.

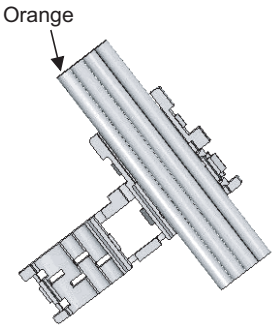


(b) Processing for T-branch connection

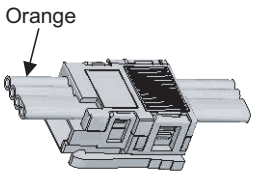
5) Cut the cover edge at the two roots using a nipper and remove the edge.



6) Attach the cover to the part from where T-branch connection is to be built.

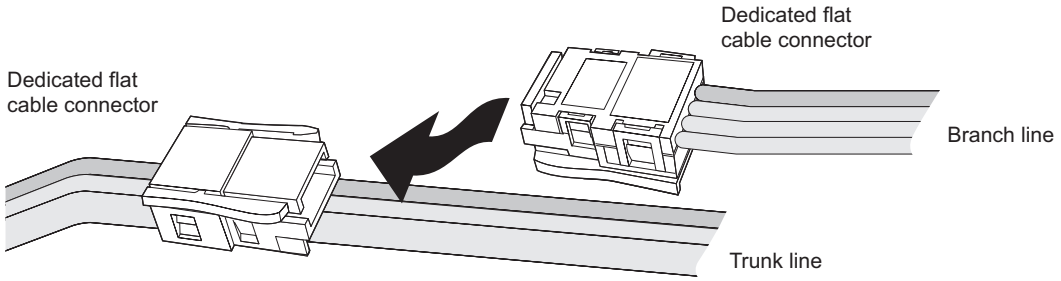


7) Follow the steps 3) and 4) shown above.



(c) Building T-branch connection

8) Connect dedicated flat cable connectors from where T-branch connection is to be built as illustrated below.



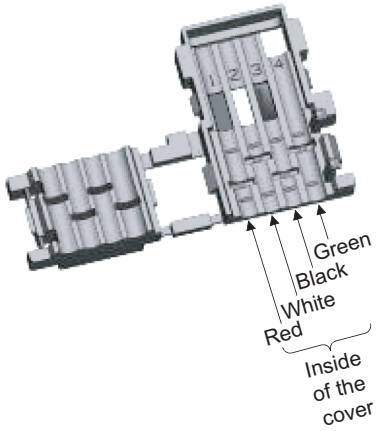
6.3.2 Connecting a VCTF cable connector/flexible cable connector

This section describes how to connect a VCTF cable connector/flexible cable connector.

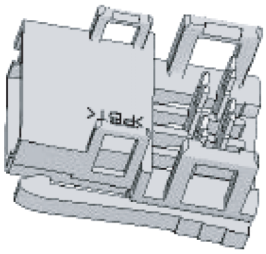
(1) Components

The components are shown below.

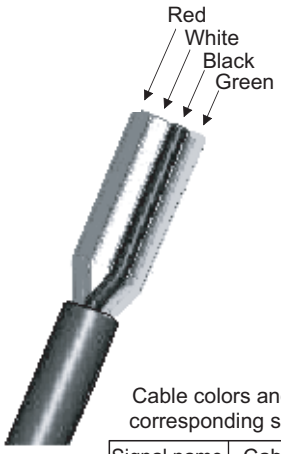
Component 1: Cover
For VCTF cable connection: Green
For flexible cable connection:
Yellowish green



Component 2: Body (light blue)



Component 3:
VCTF cable/flexible cable



Cable colors and the corresponding signals

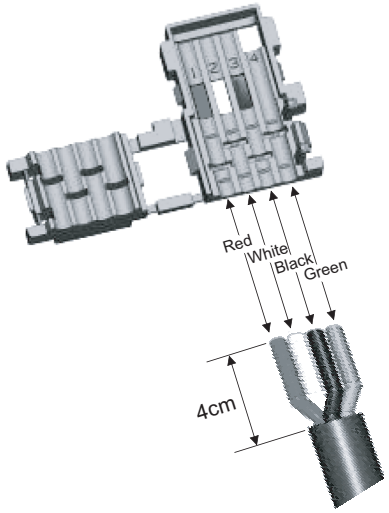
Signal name	Cable color
+24V	Red
DA	White
DB	Black
24G	Green

(2) Procedures

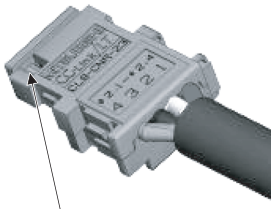
The procedures are as illustrated below.

(a) Processing cable end

1) Place each wire end of the VCTF cable/flexible cable on the guide having the same color as the wire.

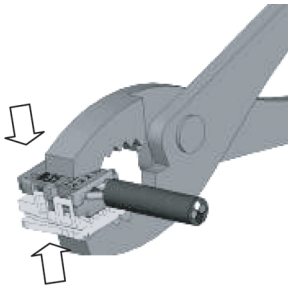


2) Close the cover so that the VCTF cable/flexible cable may be held between both sides of the cover.
When the wiring is correct, the green wire is visible through the notch window.
If a red, white, or black wire is visible through the window, open the cover and correct the wiring.
Incorrect wiring may cause failure of the module.

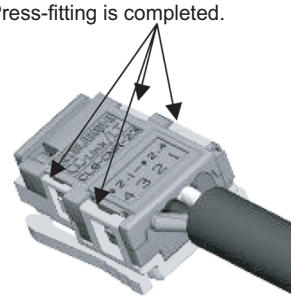


Green: Correct wiring
Red, white, or black: Incorrect wiring

3) Assemble the cover with the body and press them using pliers.

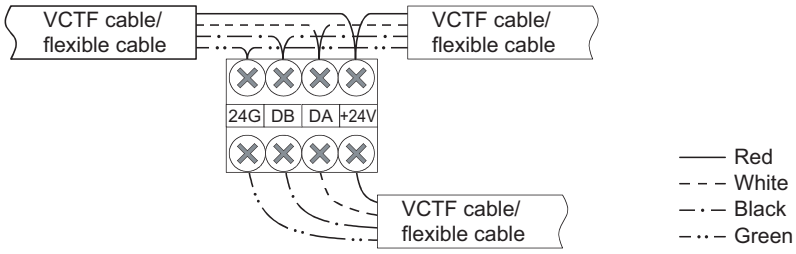


4) Check that all of four latches are engaged.
Press-fitting is completed.



(b) Building T-branch connection (VCTF cable/flexible cable)

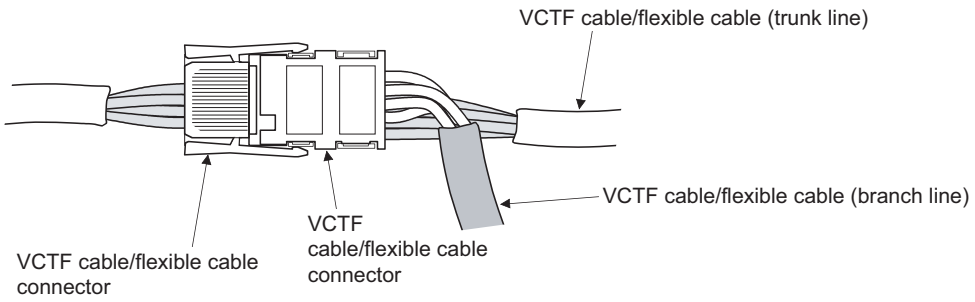
5)-1 When using a terminal block for T-branch connection
When connecting a VCTF cable/flexible cable to a terminal block, connect the wires so that the wire colors match with the corresponding terminals.



*1 When connecting a dedicated flat cable to a terminal block (e.g. Using a VCTF cable for the trunk line and dedicated flat cables for branch lines), match "+24V", "DA", "DB", and "24G" printed on the dedicated flat cable with the corresponding colors of the VCTF cable (flexible cable) as shown in the table to right. Split the dedicated flat cable so that "+24V", "DA", "DB", and "24G" cables may be independent.

Dedicated flat cable	VCTF cable/flexible cable color
+24V	Red
DA	White
DB	Black
24G	Green

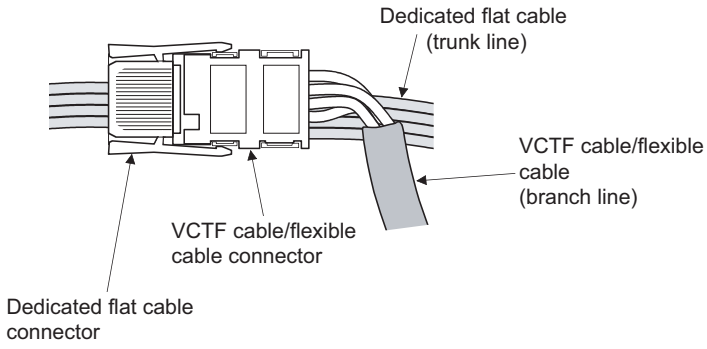
5)-2 When using a connector for T-branch connection
After removing the sheath by 7cm or more, branch the cable using a connector in the same way as the T-branch connection method for a dedicated flat cable.



(c) Building T-branch connection

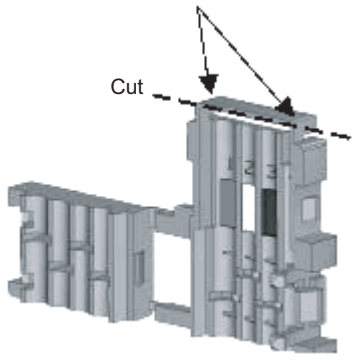
(Trunk line: Dedicated flat cable, branch line: VCTF cable/flexible cable)

6) Branch the cable using a connector in the same way as the T-branch connection method for a dedicated flat cable.

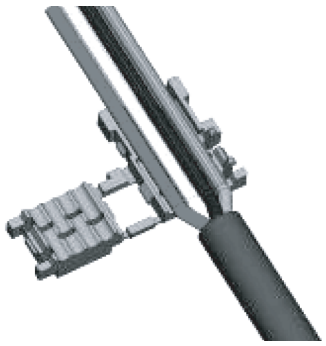


(d) Processing the VCTF cable connector/flexible cable connector (for terminating resistor)

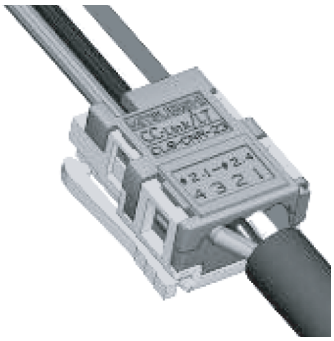
7) Cut the cover edge at the two roots using a nipper and remove the edge.



8) Place the cover at the point where the terminating resistor is to be connected.



9) Follow the steps (a) 3) and 4).



(3) Precautions for use of flexible cables

Prevent an excessive load from being applied to the connector when moving flexible cables.

6.3.3 Using cables of different types together

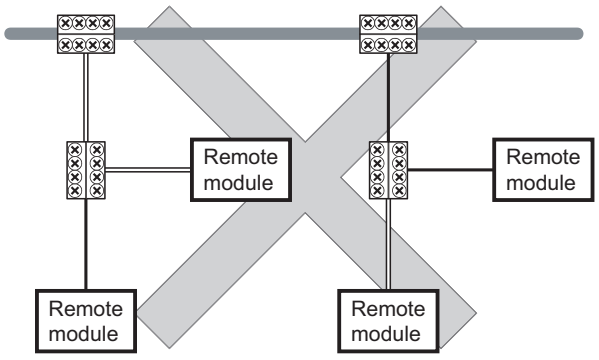
This section describes use of cables of different types.

(1) Trunk line

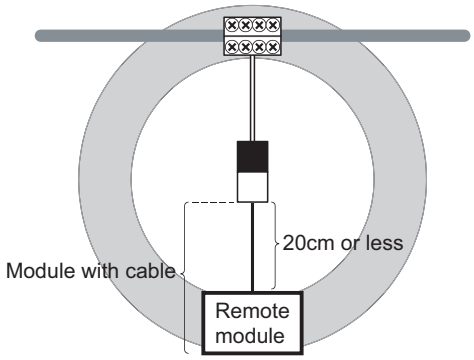
Cables of different types cannot be used together.

(2) Branch line

Cable types can be different only if the cables are used on different branches.
When a module with cable (e.g. CL1Y2-T1D2S) is used, however, cables of different types can be used together by shortening the length of the dedicated flat cable to 20cm or less. (Refer to the figures below.)

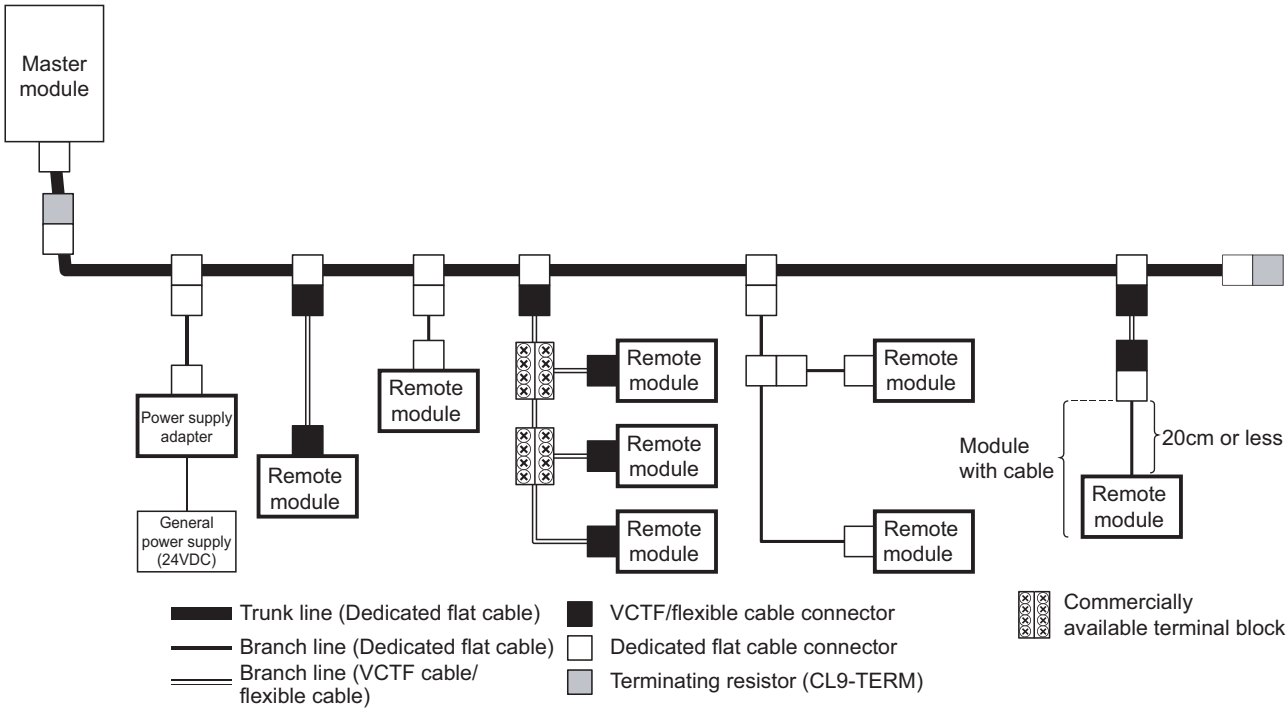


Trunk line (VCTF cable)
Branch cable (Dedicated flat cable)
Branch cable (VCTF cable)

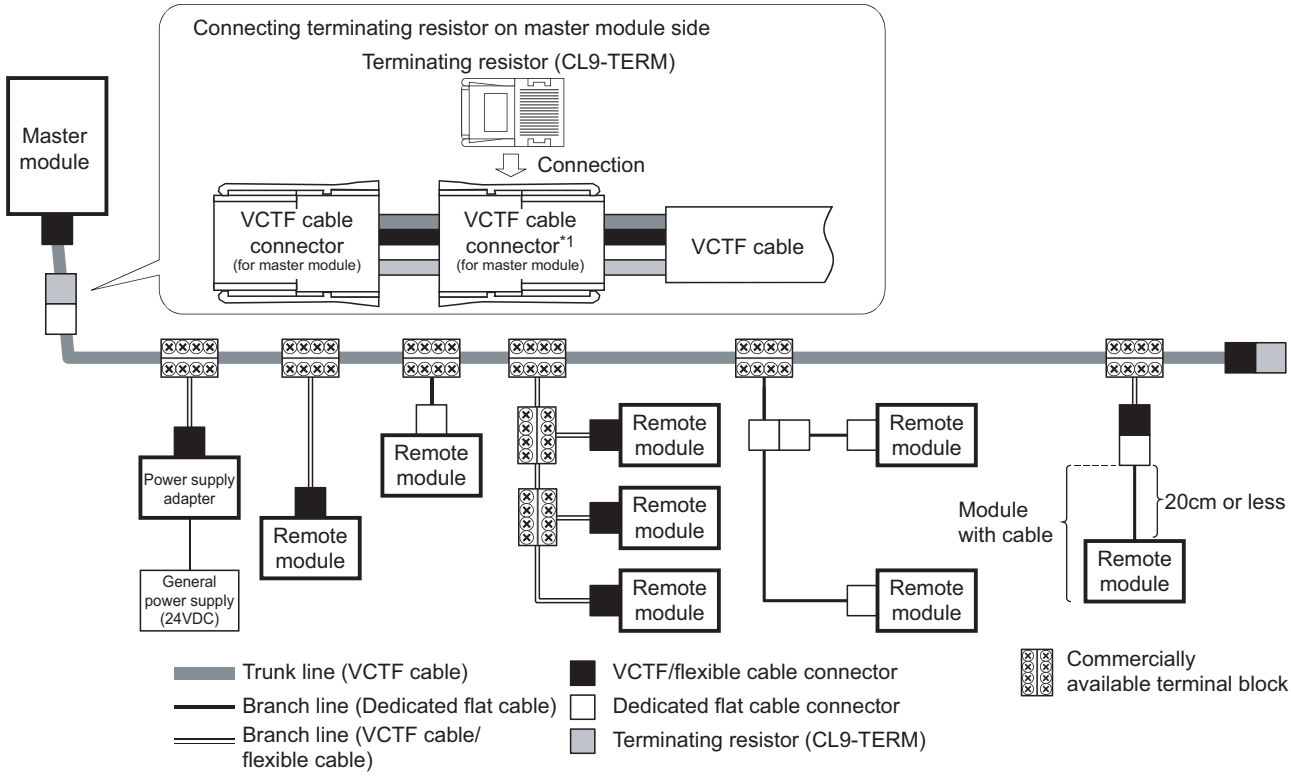


Trunk line (VCTF cable)
Branch cable (Dedicated flat cable)
Branch cable (VCTF cable)

(3) System configuration example of when a dedicated flat cable is used for the trunk line

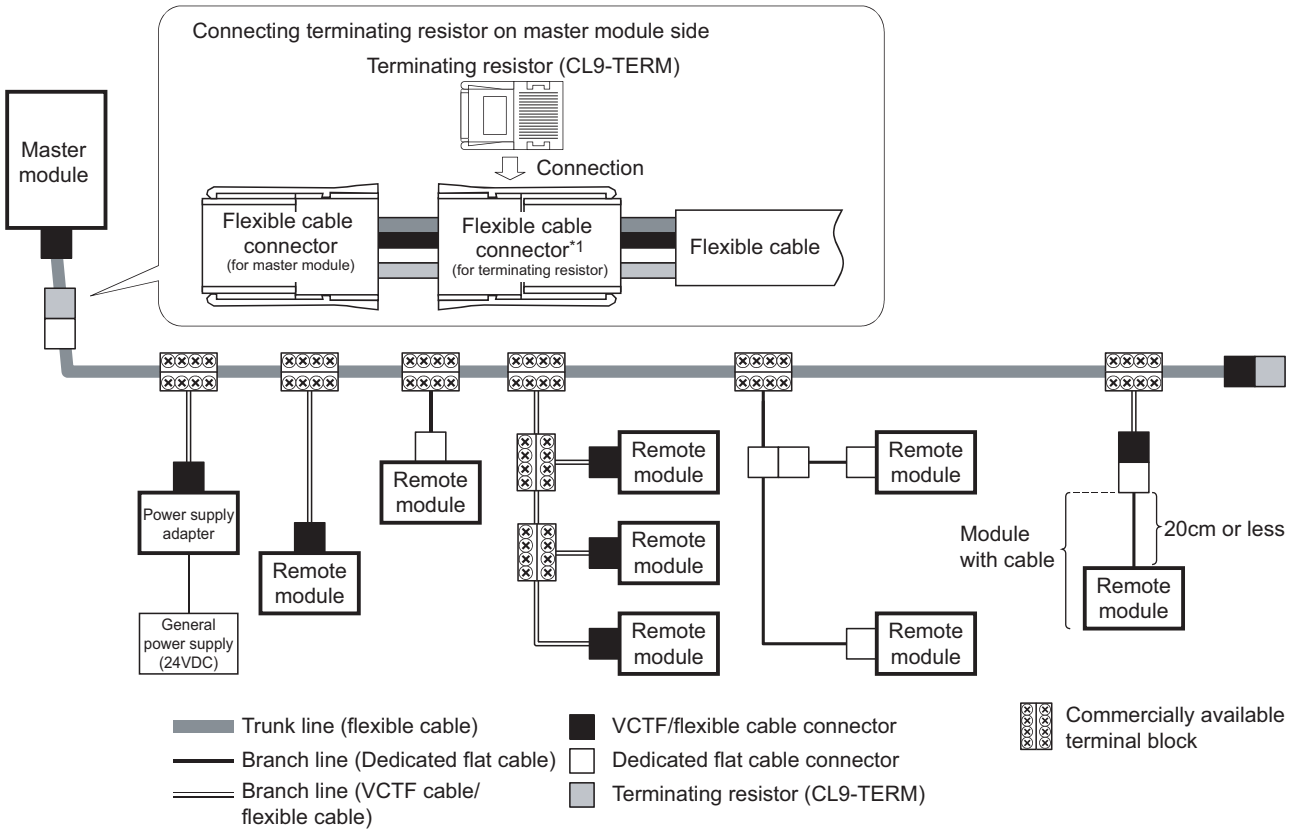


(4) System configuration example of when a VCTF cable is used for the trunk line



*1 For a processing procedure for the VCTF cable connector (for terminating resistor), refer to Page 40, Section 6.3.2.

(5) System configuration example of when a flexible cable is used for the trunk line



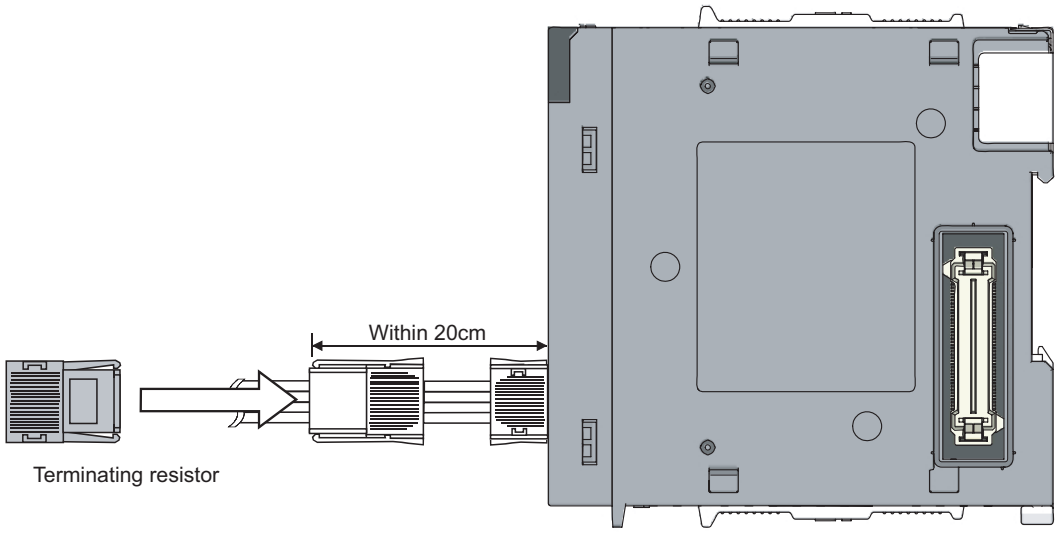
*1 For a processing procedure for the flexible cable connector (for terminating resistor), refer to Page 40, Section 6.3.2.

6.3.4 Connecting terminating resistors

Use the CL9-TERM (gray) for the terminating resistors.
For a system configuration using dedicated flat cables only, the CL9-RYVK (black) can also be used.
Note that terminating resistors of the same model must be used for both ends of the trunk line.

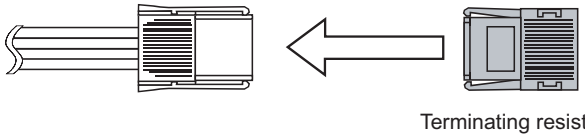
(1) Connecting a terminating resistor on the master module side

The following figure illustrates how to connect a terminating resistor.
Connect the terminating resistor within 20cm from the master module using a connector.



(2) Connecting a terminating resistor on the end of the trunk line

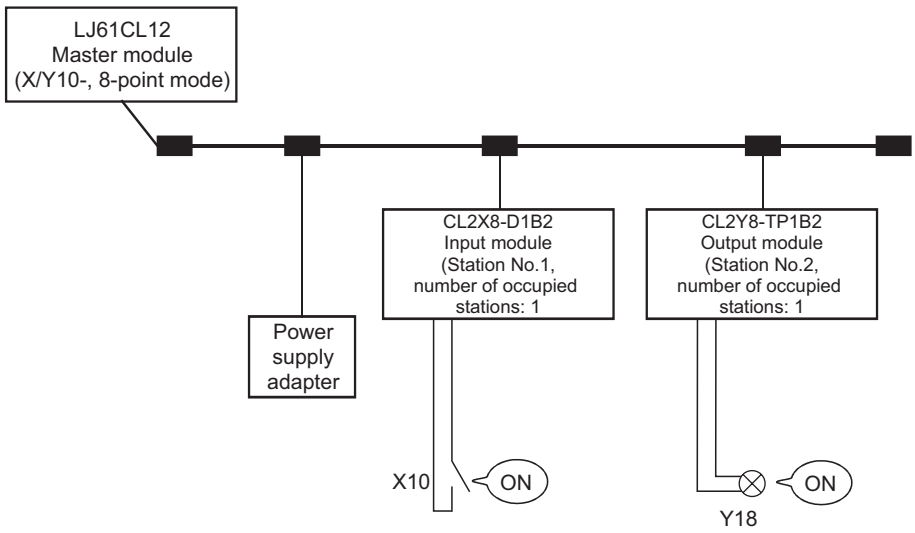
The following figure illustrates how to connect a terminating resistor to the opposite end of the master module.



6.3.5 Checking wiring

Check wiring between remote I/O stations and external devices.

Ex. For the master module, the start I/O number is set to X/Y10 and the point mode is set to 8-point mode.



(a) Checking wiring between the input module and the external device

1. **Turn on the switch corresponding to X10 of the external device connected to the input module on station No. 1.**
2. **Monitor devices using GX Works2 or the display unit. When X10 is on, this indicates that the input module and the external device are normally connected.**
   For device monitoring procedures, refer to the following.
   - Using GX Works2
     GX Works2 Version 1 Operating Manual (Common)
   - Using a display unit
     MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

(b) Checking wiring between the output module and the external device

1. **Forcibly turn on Y18 by device test using GX Works2 or the display unit.**
2. **When the lamp corresponding to Y18 of the external device turns on, this indicates that the output module and the external device are normally connected.**
   For device test procedures, refer to the following.
   - Using GX Works2
     GX Works2 Version 1 Operating Manual (Common)
   - Using display unit
     MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

6.4 Installing/Removing a Remote Station

A remote station on CC-Link/LT cannot be installed or removed while the CPU module is in the RUN status.

Install or remove a remote station in either of the following status:

- The system is powered off.
- The CPU module is in the STOP status (The RUN/STOP/RESET switch of the CPU module is set to STOP).

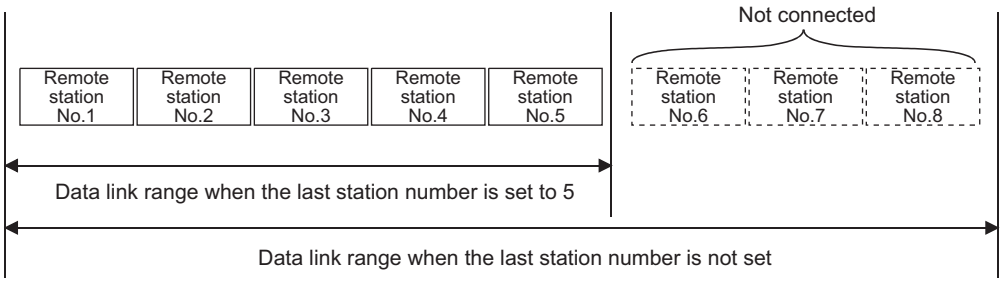
Point

- If a remote station is installed/removed while the CPU module is in the RUN status, it may cause system failure or incorrect input/output.
- When a remote station is installed while the CPU module is in the STOP status, whether the remote station performs data link or not can be checked by any of the following operations:
  - Execute CC-Link/LT diagnostics.
  - Check that the bit of Remote station connection information (buffer memory address: 0 to 3 (Un/G0 to 3) corresponding to the remote station is on.
  - Check that the PW LED and L RUN LED of the remote station are on.

6.5 Last Station Number Setting

The last station number is set to perform data link up to the last remote station in connection with the network and not to perform data link with unconnected stations.
This setting is optional but useful to optimize link scan time.

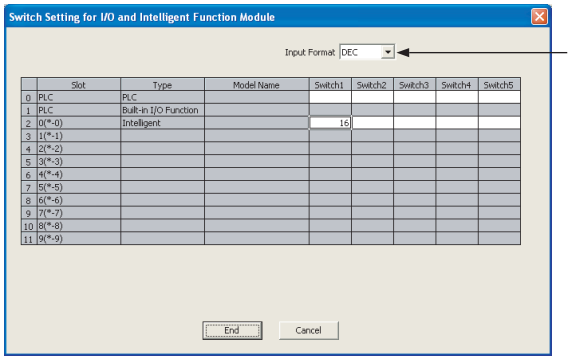
Ex. When 16-point mode is set, the number of occupied I/O points is set to 128 points, and the last remote station in connection with the network is numbered as "5"
By setting "5" as the last station number, the link scan time is optimized.



(1) Setting procedure

Set the last station number using the intelligent function module switch setting of GX Works2.

Parameter ⇨ [PLC Parameter] ⇨ [I/O Assignment] ⇨ Switch Setting button



Set the intelligent function module switches in 16-bit data.
When the last station number is not set, Switch 1 is set to "0" (default), and data link is performed among stations within the range of the number of connectable stations.

Intelligent function module switch	Setting item	
Switch 1	Last station number setting	Set the last station number among stations that perform data link. This setting disables data link with unconnected stations, reducing link refresh time. When a station number exceeding the number of connectable stations is set, the setting is ignored. (☞ Page 33, Section 6.2) <Setting range> 1 to 64 When 0 or more than 64 is set, data link is performed among stations within the number of connectable stations.
Switch 2	No setting (blank)	
Switch 3	No setting (blank)	
Switch 4	No setting (blank)	
Switch 5	No setting (blank)	

Point

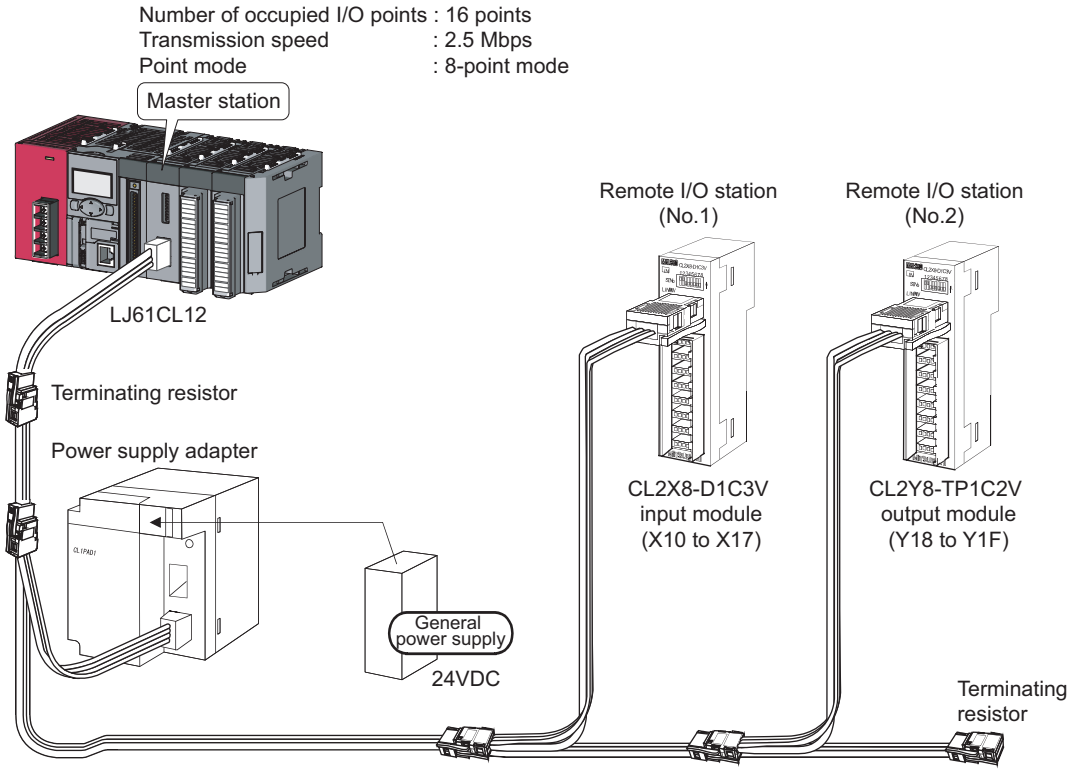
Do not set Switch 2 through Switch 5. Doing so may result in malfunction.

CHAPTER 7 PROGRAMMING

This chapter describes the programming of the master module.

7.1 System Configuration Example

The system in which two remote I/O stations are connected is used as an example in this section.



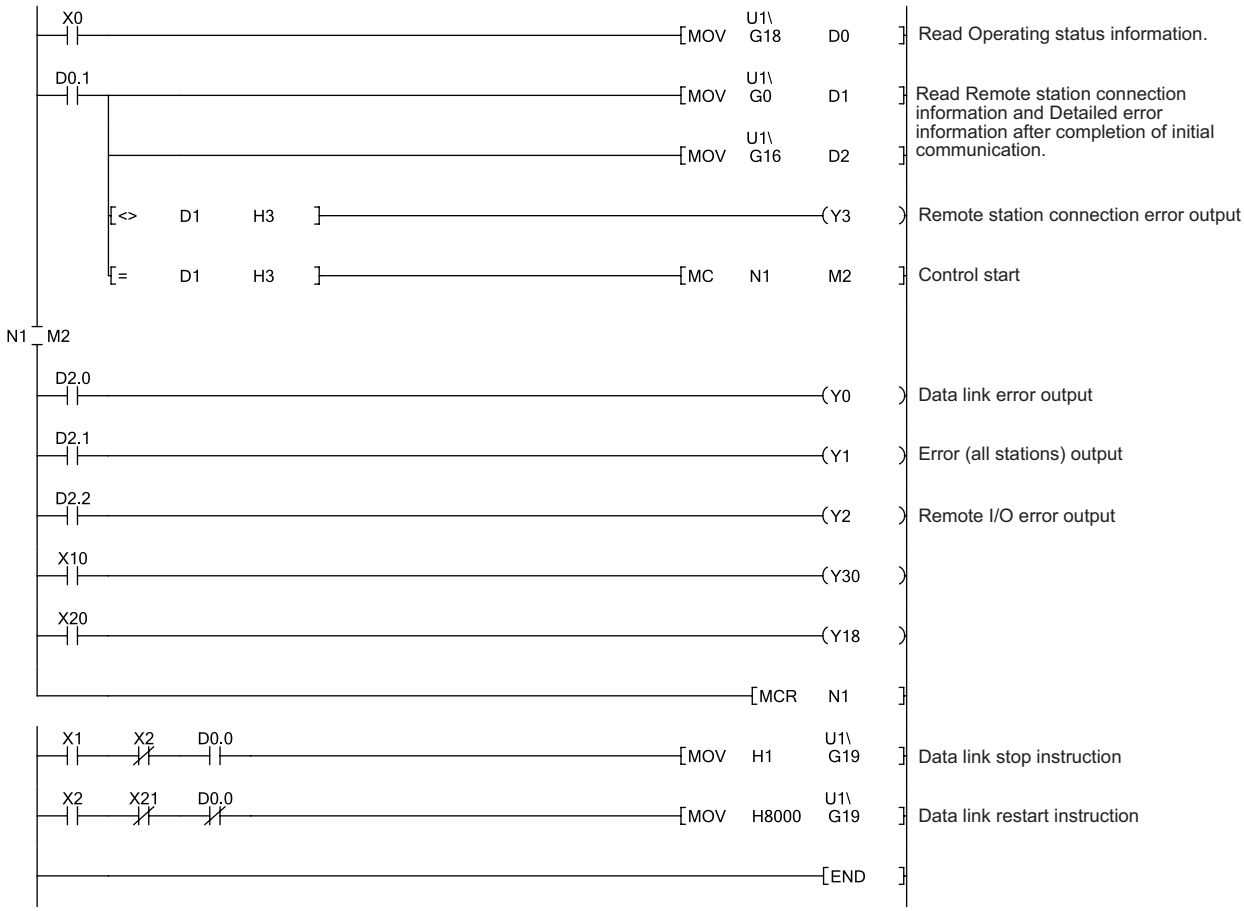
7.2 Devices Available for Users

The following table lists the devices available for users.

Device	Description
X0	CC-Link/LT control start contact
X1	Data link stop instruction contact
X2	Data link restart instruction contact
Y0	Data link error output
Y1	Error (all stations) output
Y2	Remote I/O error output
Y3	Remote station connection error output
M2	Control start flag
D0	Operating status information
D1	Remote station connection information
D2	Detailed error information

7.3 Program Example

The following is a program example.



CHAPTER 8 TROUBLESHOOTING

This chapter describes troubleshooting of CC-Link/LT.

8.1 Condition of Each Station in Case of Failure Station Status if an Error Occurs

The following table lists station status if an error occurs.

Data link status	Master station		Remote station	
	Remote input	Remote output	Input	Output
The CPU module on the master station is faulty and stopped (data link stopped).	Maintained	Maintained	Continued*1	Maintained/OFF*2
A remote station is faulty due to an error such as data link error (data link continued).	Input data from the faulty remote station are cleared.	Continued	Continued*1	Maintained/OFF*2
Power of a remote station is shut off (data link continued).	Input data from the de-energized remote station are cleared.	Continued	Depends on external signals.	All OFF

*1 Although external data are input (The input LED turns on.), the data are not sent to the master station.
*2 The status depends on the output hold setting of the remote station.

8.2 Visual Check

Check the following:

(1) Checking LEDs of the master station

Check that no error occurs in the master module using LEDs by the following procedure.

For LED indication and module status, refer to ☞ Page 15, CHAPTER 2.

1. **Power on the system and check the RUN LED of the master station.**

If the RUN LED does not turn on, troubleshoot with reference to the following.

☞ Page 55, Section 8.3.1

2. **Check the L RUN LED of the master station.**

If the L RUN LED of the master station does not turn on, troubleshoot with reference to the following.

☞ Page 55, Section 8.3.2

3. **Check the ERR. LED of the master station.**

If the ERR. LED of the master station is on or flashing, troubleshoot with reference to the following.

☞ Page 56, Section 8.3.3

4. **Check the L ERR. LED of the master station.**

If the L ERR. LED of the master station is on or flashing, troubleshoot with reference to the following.

☞ Page 57, Section 8.3.4

(2) Checking LEDs of a remote I/O station

Check that no error occurs in a remote I/O station using LEDs by the following procedure.

For troubleshooting of a remote device station, refer to the user's manual for the remote device station used.

1. **Check the PW LED of the remote I/O station.**

If the PW LED of the remote I/O station does not turn on, troubleshoot with reference to the following.

☞ Page 59, Section 8.4.1

2. **Check the L RUN LED of the remote I/O station.**

If the L RUN LED of the remote I/O station does not turn on, troubleshoot with reference to the following.

☞ Page 60, Section 8.4.2

3. **Check the L ERR. LED of the remote I/O station.**

If the L ERR. LED of the remote I/O station is on or flashing, troubleshoot with reference to the following.

☞ Page 60, Section 8.4.3

(3) Checking communication cables and wiring

Check that no error occurs in the communication cables, the connectors and terminating resistors are securely connected, and the system is correctly wired. (☞ Page 36, Section 6.3)

8.3 Troubleshooting of the Master Station

This section describes troubleshooting of the master station.

8.3.1 The RUN LED does not turn on

Check the following:

Check item	Action
The module is incorrectly connected.	Disconnect the module and connect it again.
The internal current consumption of the entire system exceeds the rated output current of the power supply module.	Change the system configuration so that the internal current consumption may be within the rated output current. For how to calculate current consumption of the entire system, refer to the following. MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

If the RUN LED does not turn on even after the above actions are taken, the possible cause is a hardware failure. Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.3.2 The L RUN LED does not turn on

Check the following:

Check item	Action
The CPU module has just exited from reset status.	It takes time for the L RUN LED to turn on after the CPU module exits from reset status. Wait for a while.
The test mode switch is on.	• When the L ERR. LED is on, troubleshoot with reference to the following. (☞ Page 57, Section 8.3.4) • When the L ERR. LED is not on, please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
Data link stop (bit 0) of Data link stop/restart instruction (buffer memory address: 19 (Un/G19)) is on.	Turn off the Data link stop then turn on Data link restart (bit 15).*1
The number of occupied I/O points set using the switch exceeds the number of occupied I/O points of the CPU module.	Correct the setting then power off and on the system or reset the CPU module. (☞ Page 15, CHAPTER 2)

*1 When Data link stop and Data link restart are simultaneously turned on, the instruction of Data link stop takes priority. Turn off Data link stop before turning on Data link restart.

If the L RUN LED does not turn on even after the above actions are taken, the possible cause is a hardware failure. Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.3.3 The ERR. LED is on or flashing

Check the following:

(1) The ERR. LED is on

Check item	Action
The transmission speed setting switch is incorrectly set.	Correct the setting then power off and on the system or reset the CPU module. (☞ Page 15, CHAPTER 2)
The point mode setting switch is incorrectly set.	Correct the setting then power off and on the system or reset the CPU module. (☞ Page 33, Section 6.2)

If the ERR. LED remains on even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

(2) The ERR. LED is flashing

When the operation setting switch is switched after power-on, the ERR. LED starts flashing. Reset the switch to the status before the switching.
If the ERR. LED remains flashing even after that, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.3.4 The L ERR. LED is on or flashing

Check the following:

(1) The L ERR. LED is on

Check item	Action
The test mode switch is on.	Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
A remote station is connected outside the control range.	Remove the remote station connected outside the control range. Increase the number of occupied I/O points. Set a greater value for the last station number. After taking the above actions, power off and on the system or reset the CPU module.
A faulty remote station is detected by Faulty station information (buffer memory address: 4 to 7 (Un/G4 to 7)). (☞ Page 68, Appendix 1)	Troubleshoot the faulty remote station. Remote I/O station: ☞ Page 59, Section 8.4 Remote device station 📖 User's manual for the remote device station used
A communication cable is incorrectly wired.	Correct the wiring.*1 (☞ Page 36, Section 6.3)

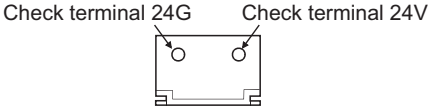
*1 Check for short circuit, reverse connection, disconnection, excessive pressure, terminating resistors, overall cable distance, branch line distance (overall branch line length, maximum branch line length), and surrounding environment such as a noise.

If the L ERR. LED remains on even after the above actions are taken, the possible cause is a hardware failure. Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

(2) The L ERR. LED is flashing

Check item	Action
Error (all stations) (bit 1) of Detailed error information (buffer memory address: 16 (Un/G16)) is not on.	Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
A 24VDC supply voltage is outside the specified range.	Reduce the supply voltage within the specified range.*1
A faulty remote station is detected by Faulty station information (buffer memory address: 4 to 7 (Un/G4 to 7)). (☞ Page 68, Appendix 1)	Troubleshoot the faulty remote station. Remote I/O station: ☞ Page 59, Section 8.4 Remote device station 📖 User's manual for the remote device station used
A communication cable is incorrectly wired.	Correct the wiring.*2 (☞ Page 36, Section 6.3)

*1 Measure a voltage using check terminals on the terminating resistor.



*2 Check for short circuit, reverse connection, disconnection, excessive pressure, terminating resistors, overall cable distance, branch line distance (overall branch line length, maximum branch line length), and surrounding environment such as a noise.

If the L ERR. LED remains flashing even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.4 Troubleshooting of Remote I/O Stations

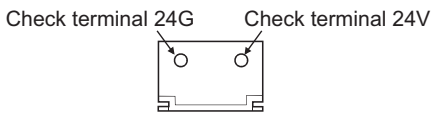
This section describes troubleshooting of remote I/O stations.
For troubleshooting of a remote device station, refer to the user's manual for the remote device station used.

8.4.1 The PW LED does not turn on

Check the following:

Check item	Action
The communication cable connected to the power supply is incorrectly wired.	Correct the wiring.*1
A communication cable is connected to the LINK connector of the dedicated power supply or power supply adapter.	Connect the cable to the LINK/POWER connector.
A 24VDC supply voltage is outside the specified range.	Reduce the supply voltage within the specified range.*2

*1 Check for short-circuit, reverse connection, disconnection, and excessive pressure.
*2 Measure a voltage using check terminals on the terminating resistor.



If the PW LED does not turn on even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.4.2 The L RUN LED does not turn on

Check the following:
After changing a remote station number, power off and on the system.

Check item	Action
After data link is established, the transmission speed setting of the master station was changed.	Power off and on the system.
A communication cable is incorrectly wired.	Correct the wiring.*1 (☞ Page 36, Section 6.3)
The station number setting switch is incorrectly set.	Correct the station number with meeting the following: • The number is 1 to 64. • The ones digit is 0 to 9. • Do not set the number using the output hold setting switch and response speed setting switch. After changing a remote station number, power off and on the system.
A station number is set outside the control range of the master station.	• Check that the numbers of remote stations occupied by the master station are 1 to 64. • Check that station numbers set on remote stations are within the control range of the master station. After changing a remote station number, power off and on the system.
The operation setting switch of the master station is incorrectly set.	Correct the setting. (☞ Page 15, CHAPTER 2) After correcting the setting, power off and on the system or reset the CPU module.

*1 Check for short circuit, reverse connection, disconnection, excessive pressure, terminating resistors, overall cable distance, branch line distance (overall branch line length, maximum branch line length), and surrounding environment such as a noise.

If the L RUN LED does not turn on even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.4.3 The L ERR. LED is on or flashing

Check the following:

Check item	Action
Switch setting is changed after power-on.	Return the switch setting to the status before the switching.
A communication cable is incorrectly wired.	Correct the wiring.*1 (☞ Page 36, Section 6.3)

*1 Check for short circuit, reverse connection, disconnection, excessive pressure, terminating resistors, overall cable distance, branch line distance (overall branch line length, maximum branch line length), and surrounding environment such as a noise.

If the L ERR. LED remains on or flashing even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.5 I/O Errors in Remote I/O Stations

This section describes troubleshooting on I/O errors in remote I/O stations.

8.5.1 Input data cannot be read from a remote I/O station

Check the following:

Check item	Action
The master station does not recognize the relevant remote I/O station. (☞ Page 63, Section 8.7)	Correct the wiring of the communication cable.*1 (☞ Page 36, Section 6.3)
The input LED of the relevant remote I/O station is not on.	Correct the wiring between the remote I/O station and the external device.
An incorrect remote input address is specified.	Correct the address.
A station number is duplicated.	Correct the station number. After changing a remote station number, power off and on the system.

*1 Check for short circuit, reverse connection, disconnection, excessive pressure, terminating resistors, overall cable distance, branch line distance (overall branch line length, maximum branch line length), and surrounding environment such as a noise.

If input data cannot be read from the remote I/O station even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.5.2 Data cannot be output from a remote I/O station

Check the following:

Check item	Action
The master station does not recognize the relevant remote I/O station. (☞ Page 63, Section 8.7)	Correct the wiring of the communication cable.*1 (☞ Page 36, Section 6.3)
The output LED of the relevant remote I/O station is not on.	Correct the address.
Wiring between the remote I/O station and the external device is incorrect.	Correct the wiring.

*1 Check for short circuit, reverse connection, disconnection, excessive pressure, terminating resistors, overall cable distance, branch line distance (overall branch line length, maximum branch line length), and surrounding environment such as a noise.

If data cannot be output from the remote I/O station even after the above actions are taken, the possible cause is a hardware failure.
Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

8.6 Error Codes

If the master module detects an error, the error details are stored in Detailed error information (buffer memory address: 16 (Un\G16)).

For error details, refer to ☞ Page 68, Appendix 1.

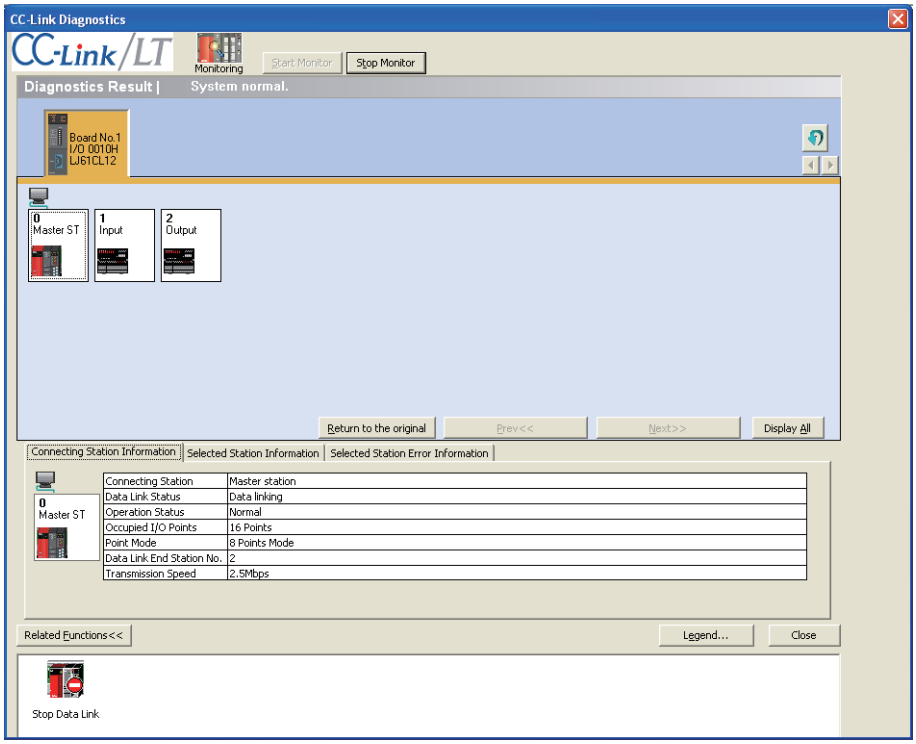
8.7 CC-Link/LT Diagnostics

After all modules are connected using connection cables, whether the modules are ready for data link or not can be checked.

(1) Monitoring the own station

Monitor the own station (station connected to GX Works2) status.

[Diagnostics] ⇨ [CC-Link Diagnostics]



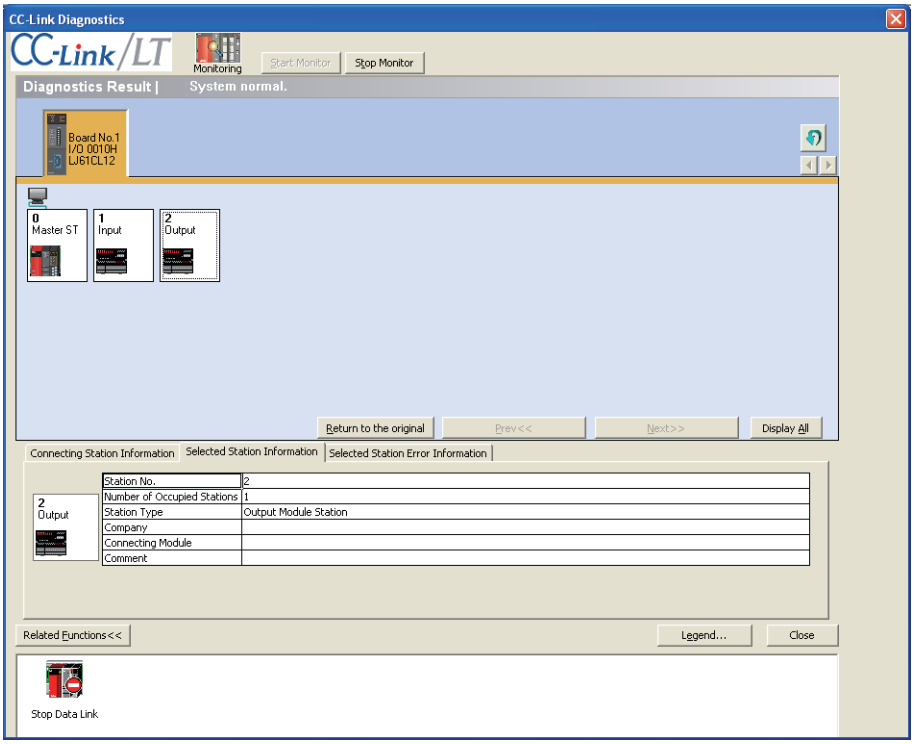
(a) Monitored items

Item		Description
Connecting Station Information	Connecting Station	Indicates that the master station is being monitored.
	Data Link Status	Displays data link status. • Data linking • Data linking stop • Initial communication incomplete
	Operation Status	Displays the operating status of the own station. • Normal • Data link error
	Occupied I/O Points	Displays the values set using the operation setting switch.
	Point Mode	
	Data Link End Station No.	Displays the last station number in data link range.
	Transmission Speed	Displays the value set using the operation setting switch.

(2) Monitoring other stations

Monitor other stations (stations not connected to GX Works2) status.

[Diagnostics] ⇨ [CC-Link Diagnostics] ⇨ "Target module"



(a) Monitored items

Item		Description
Selected Station Information	Station No.	Displays the start station number of each station.
	Number of Occupied Station	Displays the number of occupied stations.
	Station Type	Displays a station type. • Input Module Station • Output Module Station • I/O Module Station • Device Station

Point

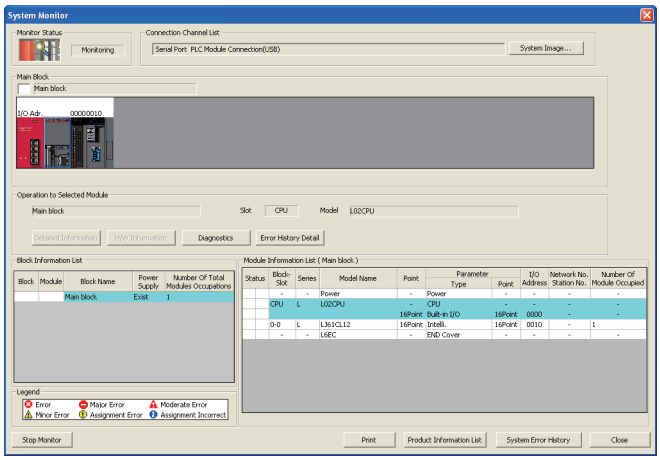
Opening the "Selected Station Error Information" tab can check data link status of the selected remote module.

(3) H/W information

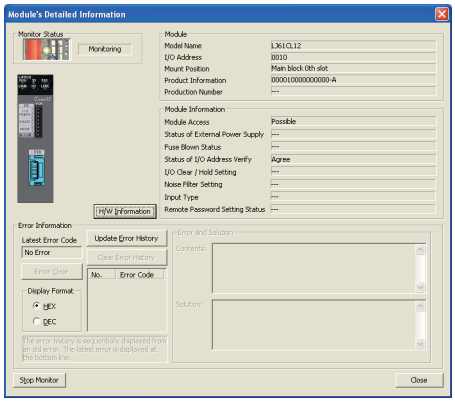
The operating status and the setting status of the master module are displayed.

(a) Operating procedure

[Diagnostics] ⇨ [System Monitor]

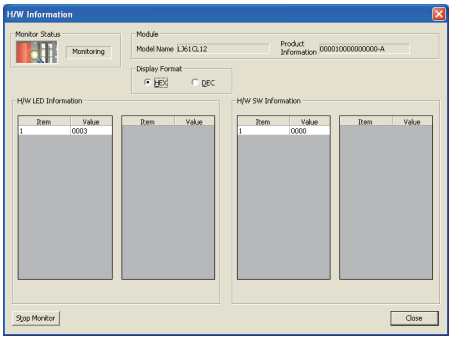


1. **Select the master module in "Main block" and click the Detailed Information button.**



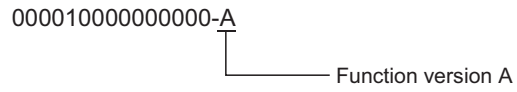
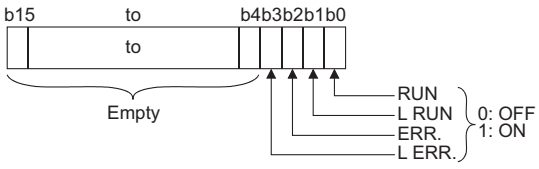
2. **Click the H/W Information button.**

Error history display is not available for CC-Link/LT.



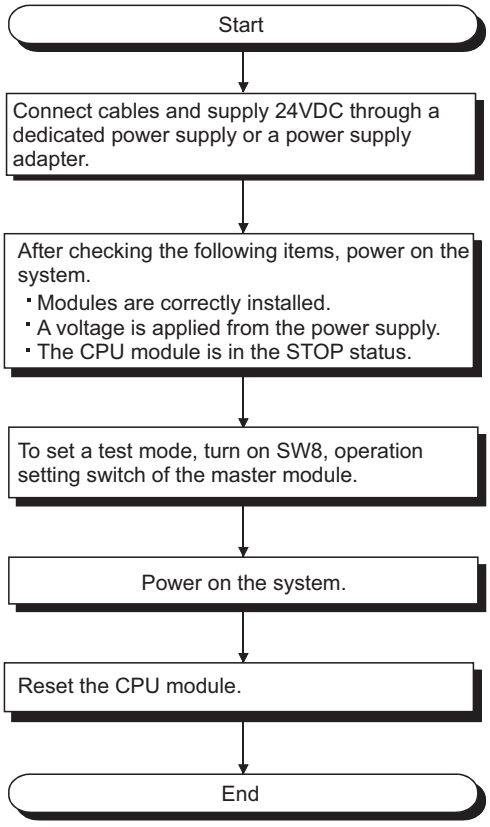
3. **H/W information is displayed.**

(b) Monitored items

Item		Description
Monitor Status		Displays the current monitoring status.
Module	Model Name	Displays the module model.
	Product Information	Displays the function version. 
Display Format		Switch the display format of "H/W LED Information" and "H/W SW Information".
H/W LED Information		Displays the LED status as shown below. 
H/W SW Information		Displays the value stored in External switch information (buffer memory address: 17 (Un/G17)). (☞ Page 69, Appendix 1 (5))

8.8 Self-loopback Test

This test checks whether the module alone operates normally or not.
Follow the steps shown below.



[Test results]

	LED indication						Action
	RUN	ERR.	SD	RD	L RUN	L ERR.	
When normal	ON	OFF	*1	*1	ON	OFF	—
When faulty	ON	OFF	OFF	OFF	OFF	ON	The hardware is faulty. Replace the module.
	OFF	OFF	OFF	OFF	OFF	OFF	
	ON	ON	OFF	OFF	OFF	OFF	Correct the operation setting switch configuration.

*1 Dimly lights or is flashing.

APPENDICES

Appendix 1 Details of Buffer Memory Areas

This section describes the details of buffer memory areas.

(1) Remote station connection information (buffer memory address: 0 to 3 (Un\G0 to 3))

Remote stations on the network is detected, and connection status of the stations is stored.

Address (decimal)	b15	b14	b13	to	b2	b1	b0
0	Station No.16	Station No.15	Station No.14	to	Station No.3	Station No.2	Station No.1
1	Station No.32	Station No.31	Station No.30	to	Station No.19	Station No.18	Station No.17
2	Station No.48	Station No.47	Station No.46	to	Station No.35	Station No.34	Station No.33
3	Station No.64	Station No.63	Station No.62	to	Station No.51	Station No.50	Station No.49

0: No remote station connected
1: Remote station connected

(2) Faulty station information (buffer memory address: 4 to 7 (Un\G4 to 7))

The data link status of remote stations is stored.

Address (decimal)	b15	b14	b13	to	b2	b1	b0
4	Station No.16	Station No.15	Station No.14	to	Station No.3	Station No.2	Station No.1
5	Station No.32	Station No.31	Station No.30	to	Station No.19	Station No.18	Station No.17
6	Station No.48	Station No.47	Station No.46	to	Station No.35	Station No.34	Station No.33
7	Station No.64	Station No.63	Station No.62	to	Station No.51	Station No.50	Station No.49

0: Normal
1: Data link error

(3) Remote I/O error information (buffer memory address: 8 to 11 (Un\G8 to 11))

The remote I/O error status of remote stations during data link is stored.
For error details, refer to the manual for each remote station.

Address (decimal)	b15	b14	b13	to	b2	b1	b0
8	Station No.16	Station No.15	Station No.14	to	Station No.3	Station No.2	Station No.1
9	Station No.32	Station No.31	Station No.30	to	Station No.19	Station No.18	Station No.17
10	Station No.48	Station No.47	Station No.46	to	Station No.35	Station No.34	Station No.33
11	Station No.64	Station No.63	Station No.62	to	Station No.51	Station No.50	Station No.49

0: No remote I/O error
1: Remote I/O error

(4) Detailed error information (buffer memory address: 16 (Un\G16))

The details of errors detected by the master station are stored. If "Error of station outside control range" is detected, b3 will be latched. Writing "1" to b3 will clear the "Error of station outside control range" information.

Bit	Name	Description
b0	Data link error	0: Data link normal 1: One or more data link faulty stations
b1	Error (all stations)	0: One or more normal data link stations 1: All stations faulty
b2	Remote I/O error	0: No remote I/O error 1: One or more faulty remote I/O stations
b3	Error of station outside control range	0: No error 1: Remote station connected to the station whose number is greater than the last station number in refresh range
b4	Point mode setting error	0: Normal 1: Point mode setting switch configured outside the range
b5	Transmission speed setting error	0: Normal 1: Transmission speed setting switch configured outside the range
b6	Switching during operation	0: No switching 1: Switched
b14 to b7	Empty	—
b15	Hardware failure	0: Normal 1: Failure identified by self-loopback test

(5) External switch information (buffer memory address: 17 (Un\G17))

The switch status of the number of occupied I/O points setting, transmission speed setting, point mode setting, and test mode is stored.

Bit	Name	Description
b2 to b0	Number of occupied I/O points setting	Status of operation setting switch SW3 to SW1 000: 16 pts. 001: 32 pts. 010: 48 pts. 011: 64 pts. 100: 128 pts. 101: 256 pts. 110: 512 pts. 111:1024 pts
b4, b3	Transmission speed setting	Status of operation setting switch SW5 and SW4 00: 156kbps 01: 625kbps 10: 2.5Mbps 11: Setting not allowed
b6, b5	Point mode setting	Status of operation setting switch SW7 and SW6 00: 8-point mode 01: 4-point mode 10: 16-point mode 11: Setting not allowed
b7	Test mode	Status of the operation setting switch SW8 0: Normal 1: Self-loopback test being executed
b15 to b8	Empty	—

0: Switch off
1: Switch on

(6) Operating status information (buffer memory address: 18 (Un\G18))

The operating status of the master module is stored.

Bit	Name	Description
b0	Data link status	0: Data link stopped 1: Data link being executed
b1	Initial communication status	0: Initial communication not complete 1: Initial communication completed
b15 to b2	Empty	—

(7) Data link stop/restart instruction (buffer memory address: 19 (Un\G19))

Data link stop and data link restart are controlled. When data link stop and data link restart are simultaneously requested, the stop request takes priority.

Bit	Name	Description	Initial value
b0	Data link stop	0: Data link stop not requested 1: Data link stop requested	0
b14 to b1	Empty	—	—
b15	Data link restart	0: Data link restart not requested 1: Data link restart requested	0

(8) Data link last station information (buffer memory address: 20 (Un\G20))

The last station number of data-link-available remote stations is stored.

Bit	Name	Description
b6 to b0	Data link last station number	The last station number of data-link-available remote stations is stored.
b15 to b7	Empty	—

Point

- The value stored in this buffer memory area depends on the number of occupied I/O points setting, point mode setting, and last station number setting configured using intelligent function module switches.
- When a remote station for which a station number greater than the value stored in this buffer memory area is set is connected, "Error of station outside control range" occurs.

(9) Detailed remote station information (buffer memory address: 32 to 95 (Un\G32 to 95))

Information on each remote station is stored.

Bit	Name	Description
b2 to b0	Number of I/O points*1	000: 1 pt. 001: 2 pts. 010: 4 pts. 011: 8 pts. 100: 16 pts.
b3	Output flag*2	0: No output 1: Data being output
b4	Input flag*2	0: No input 1: Data being input
b5	Remote device station flag	0: Remote I/O station 1: Remote device station
b6	Start station flag*3	0: Station other than the start station 1: Start station
b7	Input filter setting	0: Standard input (No setting) 1: High-speed input
b8	Output clear/hold setting	0: Clear (No setting) 1: Hold
b15 to b9	Empty	—

*1 For I/O modules, the number of input or output points is stored.

Ex. For the CL1XY2-DT1D5S, 1 point is stored.

*2 b4 and b3 indicate the presence of the remote input signal and remote output signal of the connected remote station.

Ex. For a remote I/O station used for input and output, both b4 and b3 store 1. For the one used for input, b4 and b3 store 1 and 0, respectively.

*3 For a module having two or more occupied stations, only the bit of the buffer memory area in the start station will turn on.

Appendix 2 Check Methods of Serial Number and Function Version

For check methods of the serial number and the function version of the master module, refer to the following.

MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

MELSEC-L CC-Link IE Field Network Head Module User's Manual

Appendix 3 Data Link Processing Time

This section describes the link scan time, transmission delay time, and automatic return time.

(1) Link scan time

The link scan time of CC-Link/LT is described as below.

[Link scan time (LS)]

LS = a + (b × N) × c [μs]

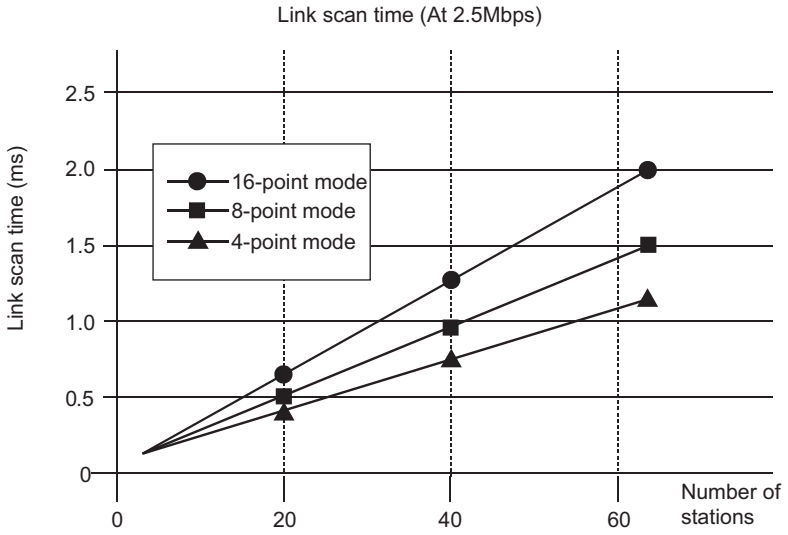
a: Constant

b: Constant

c: Constant

N: Last station number

Transmission speed		2.5Mbps	625kbps	156kbps
a		22	88	353
b	4-point mode	46	41	37
	8-point mode	56	51	47
	16-point mode	76	71	67
c		0.4	1.6	6.4



(2) Transmission delay time

The transmission delay time (time that data reaches to a destination) is described as below.

(a) Master station ← Remote station (Input)

The following formula calculates the time after a signal is input to a remote station until the CPU module device (X) turns on (off).

[Calculation formula]

SM × 2 + (2 - n)*1 × LS + Input response time of remote station (ms)

SM: Sequence program scan time of master station

LS: Link scan time (☞ Page 72, Appendix 3 (1))

n: SM ÷ LS (Round off the calculated value to the nearest integer.)

*1 Regarded as "0" when 0 or less is calculated

Ex. When the sequence scan time of the master station is 5ms, the link scan time is 1.2ms, and the input response time of the remote I/O station is 1.5ms:

SM × 2 + (2 - n)*1 × LS + Input response time of remote station (ms)

= 5 × 2 + (2 - 4)*1 × 1.2 + 1.5 [n = 4 (5/1.2 = 4.16..., Round off the calculated value to the nearest integer.)]

= 11.5 [ms]

(b) Master station → Remote station (Output)

The following formula calculates the time after the CPU module device (Y) is turned on (off) until a remote station output turns on (off).

[Calculation formula]

SM + LS × 2 + Output response time of remote station (ms)

SM: Sequence program scan time of master station

LS: Link scan time (☞ Page 72, Appendix 3 (1))

Ex. When the sequence scan time of the master station is 5ms, the link scan time is 1.2ms, and the output response time of the remote I/O station is 0.5ms:

SM + LS × 2 + Output response time of remote I/O station (ms)

= 5 + 1.2 × 2 + 0.5

= 7.9 [ms]

(3) Automatic return time

The automatic return time is the time taken for a module recovered from an error to automatically restart data link.

[Calculation formula]

37401 + A + B + C + LS [μs]

A: Constant

B: Constant

C: Constant

LS: Link scan time (☞ Page 72, Appendix 3 (1))

Transmission speed		2.5Mbps	625kbps	156kbps
A		274526.4	458605.6	1157823.07
B		22.4 × N	81.6 × N	300.8 × N
C	4-point mode	19.2 + (1.6 × N)	76.8 + (6.4 × N)	307.69 + (25.64 × N)
	8-point mode	19.2 + (3.2 × N)	76.8 + (12.8 × N)	307.69 + (51.28 × N)
	16-point mode	19.2 + (6.4 × N)	76.8 + (25.6 × N)	307.69 + (102.56 × N)

N: Last station number

Appendix 4 Difference Between L Series and Q Series

This section describes a difference between L series and Q series, and a precaution for establishing an L series system using programs used in the Q series system.

(1) Specifications comparison

The performance of the LJ61CL12 and the QJ61CL12 is the same. However, the LJ61CL12 cannot be connected to GX Developer.

(2) Precaution for applying programs

To apply programs used in the Q series system to the L series system, refer to the relevant section in the following.

MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

Appendix 5 I/O Assignment Tables

Copy the following tables and use them for recording I/O assignment for a CC-Link/LT system.

(1) In 4-point mode

Station No.	Model	Input	Output	Station No.	Model	Input	Output
		X 0	Y 0			X 0	Y 0
		1	1			1	1
		2	2			2	2
		3	3			3	3
		X 4	Y 4			X 4	Y 4
		5	5			5	5
		6	6			6	6
		7	7			7	7
		X 8	Y 8			X 8	Y 8
		9	9			9	9
		A	A			A	A
		B	B			B	B
		X C	Y C			X C	Y C
		D	D			D	D
		E	E			E	E
		F	F			F	F
		X 0	Y 0			X 0	Y 0
		1	1			1	1
		2	2			2	2
		3	3			3	3
		X 4	Y 4			X 4	Y 4
		5	5			5	5
		6	6			6	6
		7	7			7	7
		X 8	Y 8			X 8	Y 8
		9	9			9	9
		A	A			A	A
		B	B			B	B
		X C	Y C			X C	Y C
		D	D			D	D
		E	E			E	E
		F	F			F	F

(2) In 8-point mode

Station No.	Model	Input	Output	Station No.	Model	Input	Output
		X 0	Y 0			X 0	Y 0
		1	1			1	1
		2	2			2	2
		3	3			3	3
		4	4			4	4
		5	5			5	5
		6	6			6	6
		7	7			7	7
		X 8	Y 8			X 8	Y 8
		9	9			9	9
		A	A			A	A
		B	B			B	B
		C	C			C	C
		D	D			D	D
		E	E			E	E
		F	F			F	F
		X 0	Y 0			X 0	Y 0
		1	1			1	1
		2	2			2	2
		3	3			3	3
		4	4			4	4
		5	5			5	5
		6	6			6	6
		7	7			7	7
		X 8	Y 8			X 8	Y 8
		9	9			9	9
		A	A			A	A
		B	B			B	B
		C	C			C	C
		D	D			D	D
		E	E			E	E
		F	F			F	F

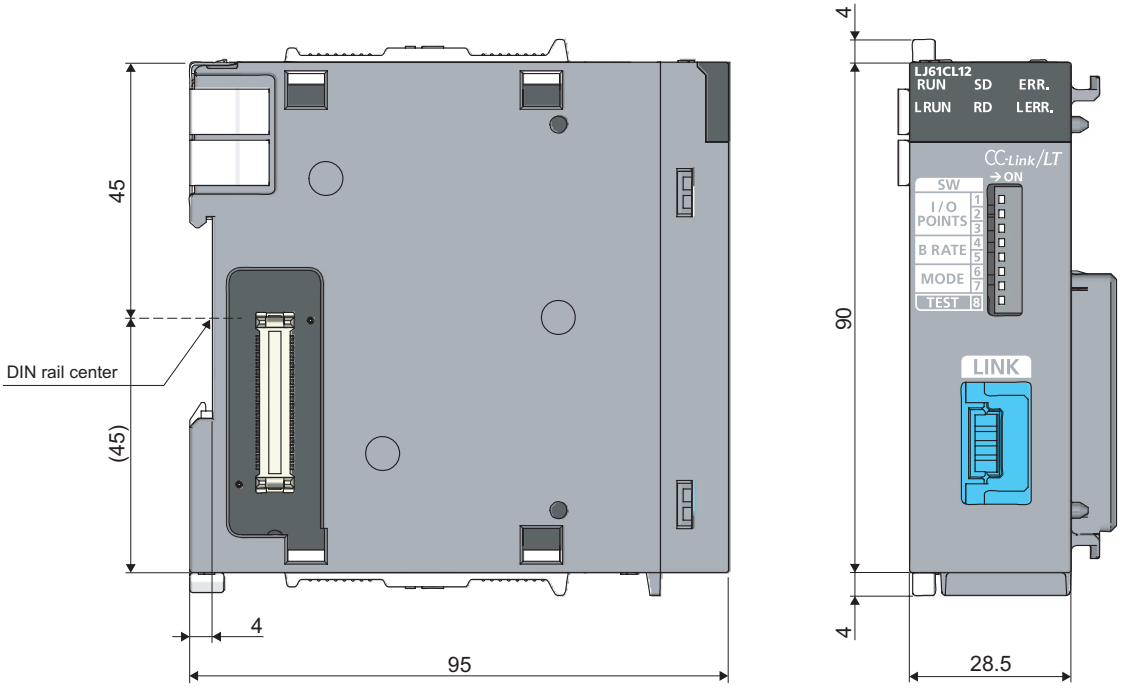
A

(3) In 16-point mode

Station No.	Model	Input	Output	Station No.	Model	Input	Output
		X 0	Y 0			X 0	Y 0
		1	1			1	1
		2	2			2	2
		3	3			3	3
		4	4			4	4
		5	5			5	5
		6	6			6	6
		7	7			7	7
		8	8			8	8
		9	9			9	9
		A	A			A	A
		B	B			B	B
		C	C			C	C
		D	D			D	D
		E	E			E	E
		F	F			F	F
		X 0	Y 0			X 0	Y 0
		1	1			1	1
		2	2			2	2
		3	3			3	3
		4	4			4	4
		5	5			5	5
		6	6			6	6
		7	7			7	7
		8	8			8	8
		9	9			9	9
		A	A			A	A
		B	B			B	B
		C	C			C	C
		D	D			D	D
		E	E			E	E
		F	F			F	F

Appendix 6 External Dimensions

The following figure shows the external dimensions of the master module.



(Unit: mm)

Memo

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REVISIONS

*The manual number is given on the bottom left of the back cover.

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MELSEC-L CC-Link/LT Master Module User's Manual

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MODEL CODE	13JZ65
SH(NA)-081012ENG-A(1107)MEE	

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